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Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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The World's Chemical Supplies

PROFESSOR ARTHUR BINZ, of Berlin, in his comprehensive review of the world's chemical supplies (reproduced on another page from a contemporary), bases his calculations as to the relative positions of nations on the value of the national exports in what he terms "the electro-technical industry," which, he says, is dependent on the chemical industry, for the years 1913 and 1921. We are not quite clear as to what "electro-technical industry" may exactly mean; there may possibly have been a slip in writing or translation just as there is one in referring to "Bellingham" instead of "Billingham." But in any case, according to the professor's calculations, America's foreign trade has expanded greatly, Great Britain has almost doubled her exports, France and Switzerland have increased theirs, while Germany's exports have dwindled to little over one-third. His general conclusion—in the nature of a rather large generalisation—is that two main tendencies are at work—the fight of each against all for access to raw materials and for markets for manufactures; and the fight of all against the niggardliness of nature in such directions as the production of artificial manures and means for stamping out plant pests, the utilisation of water-power to save coal, the economical use of coal, and the discovery of substitutes for important but limited materials, such as Chile nitrates and mineral phosphates. The task of European reconstruction, he suggests, is more hopefully to be approached by means of these latter methods than by the fight of each against all.

Dealing especially with Germany's own position, Professor Binz states that the chief inorganic industries are seriously undermined by inability to obtain cheaply and in sufficient quantities such products as lime, soda, caustic soda, and sulphuric acid. Germany has lost over half of her total coal resources in Lorraine, the Saar, and Upper Silesia, as well as the salt-springs of Alsace-Lorraine. The soda works in Central Germany, he admits, are well stocked, but here again the inadequate railway service hampers transport to consumers. In addition, Germany has lost iron, lead, and zinc ores in Upper Silesia, and the output of coal tar and its by-products is substantially reduced. By way of comparison, Professor Binz notes the strong position held by Great Britain in heavy chemicals, and the advances made in fine chemical production, though he describes the issue of the familiar battle of the dyestuffs as "still in doubt." Commenting on the installation at Billingham-on-Tees for the production of synthetic ammonia, he states that there is not likely to be any foreign competition in this branch, as every country, and especially Germany, is fully occupied in meeting its own agricultural needs. The survey generally is interesting as showing Germany's estimate of the present situation from the chemical point of view.

Further Light on the Claude Process

IN our issue of March 17 we expressed some curiosity as to why France, in view of the fact that the Claude process apparently offers so many advantages over the Haber method, should concern herself with what is going on at Oppau and Merseberg, and suggested that France's anxiety to conclude an agreement with the B.A.S.F. was far from easy to understand. The situation is by no means clarified by a review of the two rival processes contributed to a recent number of *Chemical and Metallurgical Engineering* by Mr. J. S. Negru and Mr. S. D. Kirkpatrick. Mr. Negru can speak of this subject from personal and practical acquaintance, and it is, perhaps, a pity that in the article in question he deals mainly with a group of papers originally published in *Comptes Rendus*. In our own remarks the more obvious merits of the Claude process were mentioned, and it will not be without interest to examine some considerations which arise from the other point of view.

With the Claude process the difficulties encountered in the use of a super-pressure are three in number, namely, safety, operating difficulties, and cost. So far as freedom from accident is concerned, it is obvious that the use of such extremely high pressures calls

for very careful selection of materials. In this case, however, the safety factor is one of construction rather than of constructional materials, for it is now possible to obtain steels and alloys for making tubes which will satisfactorily resist a pressure of 1,000 atmospheres at 600° C., while catalysing tubes are available which will resist more than 5,000 atmospheres. As regards operating difficulties, while Claude is able to effect conversion in a single operation, the alternative method introduces a complicated chain of operations at a pressure of 200 atmospheres, which has to be constantly maintained and restored at each step. With the Claude process the main requirement is that the joints should be tight. It is known, however, that this consideration depends more on the size of the joint than the pressure which has to be withstood, and, as the apparatus which is employed with a super-pressure is relatively smaller than that needed for lower pressure, it follows that the size of joints is also relatively smaller. This, then, would seem satisfactorily to dispose of another apparent difficulty. In the direction of cost of operation, Claude has claimed that his system requires little or no more power than the low pressure methods; that, in fact, the additional cost of producing the super-pressure is proportionately small. Figures derived as a result of practical trials show that while the efficiency of the Haber process in terms of ammonia production is 6 per cent., that of the Claude plant may reach so high a figure as 25 per cent. Moreover, the increased efficiency is not obtained as a result of increased expense, since the work of obtaining super-pressure rises proportionally with the logarithm of the pressure. Thus, if it costs, say, 2·3 to obtain 200 atmospheres, it will cost only 3·0 to obtain 1,000 atmospheres. It would seem, then, that so far as the three potential drawbacks of the Claude process are concerned, it is possible to explain them away with perfectly convincing facts, and so one still continues to wonder why France should concern herself so seriously about agreements with the B.A.S.F.

Iron Production and the Coke Shortage

THE stimulation which has been given to the metallurgical and fuel industries in this country as a result of events on the Continent has some features which, to those immediately concerned, must be highly exasperating. On occasions such as the present one is brought more fully to appreciate the exceptional interdependence of what are really distinct industries, for we are now face to face with a noteworthy example of the manner in which embarrassing conditions in one industry may exert an influence in quite a different direction. As is generally known, the iron producers in this country are finding their resources overtaxed with the urgent demands which are being made upon them; and, although additional furnaces are being started up, the cry continues for more. The situation demands caution, for the question of some sort of trade reconciliation between France and Germany, speculative matter though it is, will undoubtedly be settled without much warning, although dislocation of production in the areas affected has now gone to such lengths that, even were normal conditions restored at once, it would be several months before the leeway could be made good. There must, no doubt, be considerable temptation to restart those furnaces which have been lying idle all through the recent trade slump; but the by-product coke required for smelting is not to be had, so that the iron producer finds his opportunities crippled by the failure of a staple auxiliary industry.

It is said that for current buying there is practically no pig-iron on the market, and the majority of furnace owners have closed their books, sales in some cases being sufficient to absorb production for a couple of months ahead. The coke producers are having to shoulder the greater part of the blame for failing to cope with the home demand. On the other hand, the coke industry has been one of the chief sufferers during the last year or two of depression and strikes, and many ovens have never yet been restarted since the grave coal dispute of 1921. With export prices for coke ranging round 75s. per ton, producers can scarcely be blamed if they give priority to foreign markets in an endeavour to regain some of their prosperity; and, so far as increasing production is concerned, it must be borne in mind that a coke oven, once let down, takes some weeks to be brought up to working heat again. Then, too, there is the influence of the coal situation; for coke producers, in turn, depend upon colliery undertakings, and the recent increases which have occurred in the price of coal demand close consideration before any extensive programme of increased coke production can be undertaken. Altogether, the situation presents so many problems of interdependence that it looks as if events were travelling round a vicious circle. There is however, nothing vicious about it. It is merely one of those unfortunate episodes for which no one in particular is to blame.

The New Report on White Lead

THE Home Office Departmental Committee, presided over by Sir Henry Norman, M.P., who have been examining the question of the danger from the use of lead paints to workers, find themselves unable to support the recommendation of the Committee of 1911 that the use of lead paint for the painting of buildings should be entirely prohibited. They are satisfied—as many private users with experience of war-time substitutes are—that for outside painting, and for certain kinds of internal painting, there is at present no efficient substitute for lead paint. Moreover, the evidence shows that any prohibition of the use of lead paints for certain purposes is likely to involve an increase of cost. At the same time, the Committee realise that the statistics of poisoning arising from lead paint, in its production and in its use, are sufficiently serious to make it most desirable to limit its use as far as practicable, and, where it is used, to make its use subject to statutory regulations, as is already done in its production. They consider that as regards white lead, sulphate of lead, and paint bases which contain lead compounds these needs are adequately met by the agreement reached at the Geneva Conference, and subsequently embodied in the Convention adopted there. They accordingly recommend that legislation should be passed to give effect to the principles therein

contained. It will be necessary to defer enforcement of the prohibition of the use of white lead and sulphate of lead for the internal painting of buildings until 1927, as laid down in the Convention, in order to give sufficient time for the necessary trade modifications to be introduced, but it is suggested that regulations to deal with the continued use of lead paint should be brought into force at the earliest possible moment. Draft regulations drawn up by the Home Office, in collaboration with representative bodies, have been unanimously accepted, and the Committee are of opinion that they meet the case and should be adopted.

The Chemical Glassware Industry

A COMMUNICATION we have received from an important firm of chemical glassware manufacturers may be worth quoting as a frank expression of the disappointment which has attended the efforts of British producers to meet national needs. As the demand for British chemical ware is so small, the company have decided that its manufacture is unremunerative, and are concentrating on commercial glassware, such as feeding-bottles, because it offers better prospects of a return. "We have here," they state, "a first-class plant for making chemical glassware, but we got tired of waiting for the protection which was expected by the industry after the war, and of the crushing taxation which has followed. We have come to the conclusion that patriotism and national interests can no longer be considered by commercial firms which have to pay their way, and that the only practicable policy is to manufacture the class of article which can be produced with the least difficulty, for which there is a demand, and which gives the largest amount of profit. If we cannot do this in this country, then we shall shift out to the United States of America, where national industries are properly protected." We fear that, in this rather bitter experience, our correspondents do not stand alone.

Ernest Benn, Ltd.

AN official announcement appears in this issue of the division of the firm of Benn Brothers, Ltd. (proprietors of THE CHEMICAL AGE), into two companies. This is merely a policy of convenience or expediency, designed to promote efficiency and to facilitate working. In no other sense is there any division at all. The periodical part of the business, concerned with the issue of a group of technical and trade journals, will be conducted under the old name of Benn Brothers, Ltd., while the rapidly developing section devoted to book publication will assume the title of Ernest Benn, Ltd. There will be no change of proprietorship, and the board of directors of Ernest Benn, Ltd., will be substantially the same as that of the present company. The chairman will be Sir Ernest Benn, with whom will be associated Mr. H. P. Shapland and Mr. C. E. Hughes, with the addition of Mr. Victor Gollancz, who for the past two years has acted as manager of the Books Department. The change is necessitated by the growth of the original business, and is intended to add to the advantages of size those of concentration, specialisation, and individual attention and interest.

Oxygen Research

IN our editorial notes last week on the important research work on oxygen recently conducted by Sir Arthur Duckham, in association with Sir William Jones and others, it was stated that the research data had been handed over to the Society of Chemical Industry to be used as they thought fit in the interests of science. This, we find, was an error. The material has been offered to the newly founded Institution of Chemical Engineers, of which Sir Arthur Duckham is president—an encouraging recognition of the position of the organisation, an indication of faith in its future, and a good precedent for other investigators in similar fields to follow.

Points from Our News Pages

Dr. Levy discusses the types of respirators required in chemical works where toxic gases are produced (p. 362).

Reports of three papers given at the meeting of the Birmingham Section of the Society of Chemical Industry on March 27 are included (p. 365).

Professor Binz, of Berlin, reviews the present position in regard to the chemical supplies of the world (p. 366).

Conditions in the London chemical market are reported to be without change; export inquiry continues extremely brisk (p. 379).

Prices continue firm, though only a small amount of business has been done during the past week, states our Scottish Market Report (p. 382).

The Calendar

April		
9	Institution of Rubber Industry: "Rubber Pigments." Dr. D. F. Twiss.	Engineers' Club, Coventry Street, London, W.1.
9	Society of Chemical Industry (London Section): Papers by S. S. Zilva, J. C. Drummond, E. W. Blair, T. S. Wheeler and J. Reilly. 8 p.m.	Engineers' Club, Coventry Street, London, W.1.
9	Royal Society of Arts: Cantor Lecture—I: "Nitrates from Air." E. Kilburn Scott. 8 p.m.	John St., Adelphi, London, W.C.2.
10	Hull Chemical and Engineering Society: Presidential Address by R. Nelson. 7.30 p.m.	Hull Photographic Society's Rooms, Grey Street, Hull.
10	Society of Chemical Industry (Birmingham Section): "The Activated Sludge Process." F. R. O'Shaugnessy. "Some Studies in Catalytic Hydrogenation." E. J. Lush.	University Buildings, Edmund Street, Birmingham.
10	Institute of Metals (Birmingham Section): Annual General Meeting. 7 p.m.	Chamber of Commerce, New Street, Birmingham.
10	Institute of Metals (North East Coast Section): Annual General Meeting. 7.30 p.m.	Armstrong College, Newcastle-on-Tyne.
12	Institute of Metals (London Section): Annual General Meeting. 8 p.m.	Institute of Marine Engineers, 85-88, The Minories, Tower Hill, E.1.
13	Society of Chemical Industry (Liverpool Section). 6 p.m.	Muspratt Lecture Theatre, The University, Liverpool.
13	Faraday Society, Institute of Metals (Sheffield Section) and Manchester Metallurgical Society: Symposium and general discussion on "Alloys Resistance to Corrosion." 3 p.m.	Department of Applied Science, The University, Sheffield.
14	The Mining Institute of Scotland: Annual Meeting.	Glasgow.
18	United Alkali Co., Ltd.: Centenary dinner.	Midland Adelphi Hotel, Liverpool.

The Use of Breathing Appliances in Chemical Works

By Dr. Leonard Levy, M.A. (Cantab), F.I.C.

THE Chemical Works Regulations of 1922 postulate the provision of suitable types of breathing appliances in chemical works. It is, therefore, of interest to consider the great advances which have been made in the design of breathing appliances or respirators in the past few years. It is indeed quite possible that the regulations referred to are to some extent consequent upon the developments which have taken place in the construction of breathing appliances. This great development is, of course, due to the war. The introduction of the use of toxic gases and smokes as a method of warfare necessitated the concomitant development of means whereby troops might be efficiently protected against these agents, and the small box respirator, which was devised as a result, is well known in the British and Allied armies.

It should be borne in mind that before the war very little indeed was known regarding the production of respirators either from a chemical, mechanical, or physiological point of view. Exception, however, must be made in the use of self-contained oxygen breathing sets, to which reference is made below.

The problem of the production of suitable breathing appliances of maximum efficiency for use in chemical works is relatively a simpler matter than the production of an appliance for purposes of warfare. In the former case it is only necessary as a general rule to afford protection against one or two substances, whereas in the latter instance a breathing appliance must afford complete protection against known toxic agents of every variety, and in addition must as far as possible be capable of protection against new and therefore unknown bodies which may be produced as a result of research for this especial purpose.

Essentials of Respirators

Breathing appliances for use in chemical works must conform to certain desiderata: (1) The respirators must afford complete protection against any concentrations of toxic substances likely to be encountered. (2) They should be reasonably comfortable to wear. (3) Ample warning should be given of approaching breakdown, that is to say, the failure should be so slow that the first traces of toxic substances passed merely act as a warning to the wearer, and are quite innocuous. (4) The respirators should not deteriorate in any way when not in use. (5) The design should be such that it can be put on in a second or two with an assurance of a perfect fit. (6) If a chemical filling is employed, it should be of very high efficiency. (7) Refills for the purifying chamber should be inexpensive.

Breathing appliances may be divided broadly into two classes: (*a*) Respirators which function by a perfect purification of the contaminated atmosphere, which is freed from all toxic constituents during its passage through the appliance. These respirators are only to be employed in those cases in which the proportion of oxygen in the atmosphere after purification is adequate. (*b*) Self-contained oxygen breathing sets. These breathing appliances are intended for use in cases wherein the proportion of oxygen in the atmosphere is insufficient to support human life.

Respirators which function by purification of the toxic atmosphere may be further sub-divided into two main classes: (1) Respirators employing a chemical filling, whereby the toxic ingredient is removed by chemical or physical absorption. These are necessary in all cases in which the toxic body is present in the form of a gas or vapour. (2) Respirators composed of a filtering medium whereby the toxic substance is removed mechanically. These respirators are only suitable for use in those cases in which the toxic body is present as solid or liquid particles—gas or vapour being entirely absent.

Face-piece

Respirators of the first class consist of three portions: A face-piece, a connecting tube, and a purifying chamber carried by a suitable harness. It is not proposed to describe the construction of these appliances in any great detail, but rather to make brief mention of the salient features of the various types of appliances under discussion.

The face-piece, as it name implies, is the portion of the respirator which is attached to the face of the wearer, and it may be designed to cover the nose and mouth only, or it may be necessary to give protection to the eyes as well. The face-piece employed in the case of the small box respirator possessed two lines of protection so far as the nose and mouth were concerned. The first line of protection was that afforded by the contact of the face-piece with the head of the wearer. The second line of protection was provided by the fact that the nose was clipped and a mouthpiece was employed.

The use of nose-clips and mouthpieces, whilst undoubtedly giving the most perfect assurance of adequate protection, nevertheless suffers from the disadvantage that these adjuncts cause grave discomfort if worn for any length of time. Another point which has to be considered is the area of contact between the face-piece and the head of the wearer. If this be small, as was the case in the army face-piece, considerable pressure is exerted per unit area of the wearer's head, and the resulting discomfort is for some time very considerable.

It is desirable therefore to increase this area of contact in order to add to the comfort of wearing. The face-piece should

Fig. 1

be provided with an adjustable elastic harness in order to ensure a perfect fit upon the face of the wearer. The face-piece is always provided with inspiratory and expiratory valves, and these must be so designed and arranged that they can never cease to function, and particularly in the case of the expiratory valve the design should be such that it cannot possibly become fouled, thus admitting a portion of the toxic atmosphere directly to the interior of the face-piece.

Another important point in cases wherein the mask covers the whole of the face so as to afford protection to the eyes as well as to the nose and throat, is the question of the dimming of the eye-pieces. This can be prevented for a certain period by smearing the interior of the eye-pieces with a composition such as soap, which prevents the formation of drops of moisture owing to the reduction of surface tension.

Such treatment is only a palliative and merely lasts for a limited period. A much better method of ensuring clearness of vision, so far as the deposition of moisture upon the interior of the eye-pieces is concerned, is effected by a method due to Tissot. The air which is inspired into the mask is led by means of ducts over the surface of the eye-pieces. This air, which is colder than the atmosphere in between the face-piece and the face of the wearer, prevents the deposition of moisture upon the eye-pieces. This method can only be employed for face-pieces in which a mouthpiece is not in use.

The disposition and shape of the eye-pieces must be such that a wide field of view is obtained. A modern type of face-piece (as fitted to the " Puretha " respirator) in which the requirements enumerated above are provided for, is shown in Fig. 1.

Connecting Piece

A flexible connection must be provided between the face-piece and the purifying canister. This is composed of corrugated rubber tubing covered with stockinette. This corrugated tubing cannot be kinked in any position and stoppages due to this cause cannot therefore be produced.

Purifying Canister

The purifying canister contains the ingredients which effect the removal of all the toxic constituents either by chemical combination or physical absorption. The purifying canister must also conform to a number of requisites for the most efficient performance of its functions. The resistance to the passage of the inspired air through the purifying chamber must be as low as possible, as in the case of high resistance chambers the wearer has difficulty in obtaining an adequate supply of air, especially if engaged in the performance of heavy work.

The chemical filling is contained in the form of small granules of approximately regular size, generally speaking, about 10 to 16 mesh. The granules must have a high capacity for the absorption of the toxic substances which they are designed to remove. That is to say that a given weight of granules must absorb a maximum of these substances, and the nearer this absorption approaches to the theoretical chemical efficiency the better is the type of granule. The variation which may be met with in this way is very large. For example, the ordinary soda-lime granules, which can be purchased from any chemical dealer, if employed in a respirator against carbon dioxide, permit quantities of this gas to pass when about 20 per cent. of the theoretical chemical absorptive power of the granules has been satisfied. It is, however, quite a simple matter by suitably varying the method of manufacture and the proportions of the ingredients of soda-lime granules, to produce some which when tested in precisely the same manner do not break down until 80 per cent. of their theoretical chemical absorptive capacity has been satisfied. The former have a very low capacity and the latter a very high capacity.

It is equally important that the granules be very reactive. This means that the velocity of reaction between the substance absorbed and the granules is so great that every trace of the toxic body is absorbed during the passage of the inspired air through the canister.

High capacities and high reactivities are by no means always associated together, and many preparations which have a very high capacity for absorption cannot be employed because their reactivity is too low, and as a result small traces of the toxic substances pass through the respirator owing to incomplete absorption.

The degree of incompleteness of this absorption may only be 0·1 per cent. or less of the amount of toxic matter present, but in the case of highly poisonous gases such as phosgene and chlorine this small fraction is quite sufficient to prove absolutely fatal, if the atmosphere breathed is of the order of 1 per cent. of toxic substance.

The third very important factor which has to be satisfied by the absorbing granules is that of an adequate hardness. If the granules are insufficiently hard they will crumble during transit, or if a respirator be accidentally dropped, with a result that the resistance of the canister may easily be raised to such a degree that it is impossible to breathe through it.

In order to obtain the greatest possible efficiency within the compass of a standard respirator canister, the absorptive fillings employed are varied according to the nature of the service which the respirator is required to perform.

Types of Fillings

The following are typical classes of fillings employed : (1) for neutral vapours such as benzene, carbon tetrachloride, carbon bisulphide, etc.; (2) for ammonia; (3) for acid gases such as chlorine, hydrochloric acid, nitrous fumes, etc.; (4) for hydrocyanic acid and cyanogen; (5) for carbon monoxide and nickel carbonyl.

In the case of the majority of toxic substances the gas itself gives warning of the approaching exhaustion of the purifying canister by the passage of small innocuous traces, which produce an unmistakable physiological effect, such as lachrymation or coughing.

In the case of carbon monoxide no such effect is produced, and the wearer may easily inspire a fatal quantity of carbon monoxide without being aware of the fact that his respirator has failed.

For this reason it is essential in the case of a respirator designed to protect against carbon monoxide or nickel carbonyl to provide an automatic detector which gives an unmistakable indication to the wearer that the appliance is no longer functioning correctly.

The author has devised such a detector, whereby such traces of carbon monoxide passing the respirator cause the evolution of a small trace of iodine vapour which produces a pronounced lachrymatory effect upon the wearer, but is quite harmless.

Respirators of the second class, consisting of a filtering medium, comprise one part only. Pulvafilta respirators illustrated in Figs. 2 and 3 consist of a filter lined on the interior

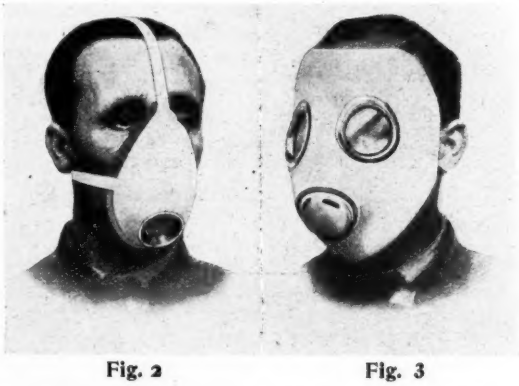

Fig. 2 Fig. 3

with rubber and provided with an inspiratory and expiratory valve. The half mask is designed to afford protection to the nose and mouth only, and the full mask provides protection for the eyes as well.

In certain instances it is necessary to provide protection against particulate clouds as well as vapours. In such cases filters may be included in the packing of the purifying canister, but a better arrangement is to surround the latter with a filtering jacket whereby a much larger area of filtration is obtained, and the consequent rise in resistance of the canister is very small.

Oxygen Breathing Sets

Self-contained oxygen breathing sets are well known and have been in use for a long time in connection with mine rescue work. They are also employed by firemen in those cases in which a lack of oxygen may be anticipated owing to the fire occurring in a confined space. These appliances consist of an oxygen cylinder and a breathing bag containing materials for removal of the carbon dioxide produced by the wearer. The atmosphere contained in the bag is maintained in continual circulation, the carbon dioxide being removed and the oxygen consumed being replenished by the cylinder provided.

These breathing appliances must be employed in all cases in which the oxygen in the toxic atmosphere is inadequate for supporting human life. They are very much heavier than the simple types of respirators already described, and are of course much more expensive.

Modern types of respirators such as those outlined in this article are of application in many industries besides strictly chemical works. Examples are afforded in the fumigation of ships, for use with cold storage plants, for blast furnace and producer plants, for firemen, for cleaning out benzol tanks and the like, for varnish factories, for drug grinding, acetylene welding and in many other industries.

The present state of the knowledge of the construction of breathing appliances is such that it is possible to construct an appliance to protect against any toxic cloud or gas very efficiently.

Reviews

THE PHASE RULE AND ITS APPLICATIONS. By ALEXANDER FINDLAY, M.A., Ph.D., D.Sc. London: Longmans Green and Co. Pp. 298. 10s. 6d.

The fifth edition of this well-known work is now issued in the series of Text Books on Physical Chemistry, edited by Sir William Ramsay and Professor Donnan. Owing to the increased attention which the phase rule has received since the last edition, several sections have been rewritten, in particular those on sulphur, phosphorus, and iron-carbon alloys. The application of the theory to the equilibrium of the Stassfurt deposits is also discussed. The book is practically a standard work, and its value is increased by the issue of the revised edition.

ATOMS. By JEAN PERRIN. Translated by D. LL. HAMMICK, M.A. London: Constable and Co., Ltd. Pp. 232. 8s. 6d.

This book, which is a translation of the eleventh French edition, has for some time been recognised as the standard review on the structure of the atom. The present translation has been revised, and some additional matter added by Professor Perrin, so that it is at present the most up-to-date technical book on the subject, as distinct from several semi-popular works recently published. The book deals concisely with the experimental and mathematical aspects of the atomic theory generally, the Brownian movement, light and the quantum theory, electrical radiation and the radio activity of elements. A special appendix, dated 1921, is also added, containing references to the latest work. The whole is very well printed and produced, and is illustrated with many diagrams and photographs.

INDUSTRIAL ORGANIC CHEMISTRY. By S. P. SADTLER, Ph.D., LL.D., and L. J. MATOS, Ph.D. Philadelphia and London: J. B. Lippincott Company. Pp. 690. 35s.

This is the fifth edition of the author's book, and is thoroughly revised since the 1912 edition, the sections on dyestuff manufacture being entirely rewritten in view of the large developments in the industry during the war. The book is very comprehensive, and deals with various organic manufacturing processes, including cane sugar, cellulose, coal tar, and fermentations, in addition the manufacture of dyes and fine chemicals by synthetic methods. It is not, as perhaps might be expected, entirely free from errors, thus blue gas (p. 441) is confused with Blau's gas, but on the whole the book is an excellent survey of the subject.

THE GENERATION AND UTILISATION OF COLD: A General Discussion held by the Faraday Society. London: The Faraday Society, 10, Essex Street, W.C.2. Pp. 273. 10s. 6d.

The matter in this book, which is reprinted from the transactions of the Faraday Society, deals with the papers given at a conference held conjointly with the British Cold Storage and Ice Association last October. The papers printed deal with both laboratory methods and industrial methods. In the former section the subjects are: (1) The Lowest Temperature yet obtained, by Professor H. Kamerlingh Onnes; (2) The Apparatus and Methods in the Leiden Cryogenic Laboratory, by Dr. C. A. Crommelin; and (3) Ethyl Chloride, by Professor C. F. Jenkin. In the industrial section there is a general survey by Mr. K. S. Murray, M.I.Mech.E., while the special papers are: (1) The Manufacture of Hydrogen, using liquifaction processes, by M. Georges Claude; (2) The Production of Liquid Oxygen for Use on Aircraft, by Mr. E. A. Griffiths; (3) The Heylandt Liquid Air Plant, by Mr. A. J. Bremner; (4) Thermometric Lag, by Messrs. E. Griffiths and J. H. Awbery; (5) Materials of Low Thermal Conductivity, by E. Griffiths; (6) The Metallurgical Aspect of the Production of Cold, and (7) A Note on the Importance of Crystal Structure and Properties of Metals at Low Temperature, by Mr. Cosmo Jones. As the book is illustrated with numerous excellent diagrams of great clearness, and also a few photographs, it forms a very valuable review of the subject in its latest developments, both theoretical and practical.

Trade Names and Chemical Formulæ

To the Editor of THE CHEMICAL AGE.

SIR,—The importation of industrial chemicals under present tariff conditions necessitates careful handling, and requires special knowledge on the part of the importer, owing to the fact that so many of the chemicals commonly used in industry are subject to Key Industry Duty under Part I of the Safeguarding of Industries Act. Lists of chemical products liable to the duty are contained in a pamphlet issued by the Board of Trade and obtainable from H.M. Stationery Office or through any bookseller, but even when in possession of the pamphlet the importer's difficulties are by no means at an end, inasmuch as the lists specify merely the chemical names, whereas invoices for imported chemicals frequently indicate nothing beyond the ordinary trade descriptions. The following list of important chemicals (which does not claim to be exhaustive) should, therefore, prove of material assistance to importers by showing the relationships existing between trade and chemical designations:—

General Name.	*Chemical Composition.*
Alacet	Formic acid.
Alum, ammonia	Ammonium-aluminium sulphate.
Alumina	Aluminium oxide.
Aniline	Amido-benzene.
Antimony vermillion	Antimony sulphide.
Arsenic orange	Arsenic disulphide.
Azurite	Basic cupric carbonate.
Barytes	Barium sulphate.
Bichrome	Potassium bichromate.
Bleaching powder	Calcium hypochlorite.
Blue verditer	Basic cupric carbonate.
Blue vitriol	Cupric sulphate.
Borax	Sodium biborate.
Bremen blue	Basic copper carbonate.
Cadmium yellow	Calcium sulphide.
Calomel	Mercurous chloride.
Carbolic acid	Phenol.
Caustic potash	Potassium hydroxide.
Ceruse	White lead.
Chili saltpetre	Sodium nitrate.
Chinese white	Zinc oxide.
Chrome green	Chromium oxide.
Copperas	Ferrous sulphate.
Corrosive sublimate	Mercuric chloride.
Cream of tartar	Potassium bitartrate.
Crocus	Oxide of tin.
Derby red	Basic lead chromate.
Dutch white	White lead.
Eau-de-javelle	Potassium hypochlorite.
Eau-de-Labarraque	Sodium hypochlorite.
Emerald green	Copper aceto-arsenite.
Epsom salts	Magnesium sulphate.
Ferroprussiate	Potassium ferrocyanide.
Formaline	Formaldehyde.
Glauber's salt	Sodium sulphate.
Green vitriol	Ferrous sulphate.
Horn silver	Silver chloride.
Hypo	Sodium thiosulphate.
Iron mordant	Ferric sulphate.
Indian red	Ferric oxide.
King's yellow	Arsenic sulphide.
Litharge	Lead monoxide.
Lunar caustic	Silver nitrate.
Magnesite	Magnesium carbonate.
Malachite	Basic copper carbonate.
Paris green	Copper aceto-arsenite.
Plaster of Paris	Calcium sulphate (anhydrous).
Prussian blue	Ferric ferrocyanide.
Pyrites	Iron disulphide.
Rouge	Ferric oxide.
Salol	Phenyl salicylate.
Spirits of wine	Ethyl alcohol.
Sugar of lead	Lead acetate.
White vitriol	Zinc sulphate.

Inquiries are invited from importers and others in doubt as to the full tariff description of particular chemicals and their liability to Key Industry Duty.—Yours, etc.,

H. V. BROWN.

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Society of Chemical Industry

Papers Read at Birmingham

An interesting contribution on "Studies in Oil Hydrogenation" was made by Mr. E. Lush at a meeting of the Birmingham and Midland Section of the Society of Chemical Industry at the University of Birmingham on Tuesday, March 27. Two other papers were also read. Dr. E. B. Maxted, chairman of the Section, presided.

Some Studies in Hydrogenation

Mr. Lush explained how the physical conditions of the addition of hydrogen to oils, by means of nickel acting as a catalyst, lent themselves naturally to continuous working; the catalyst being a solid, the oil a liquid, and the substance producing the desired change, viz.: hydrogen, a gas, it should be possible to distribute nickel throughout a closed vessel, keep the vessel full of hydrogen and allow oil to run in at one end and out at the other—the speed of flow regulating the degree of hydrogenation.

It was pointed out why porous supports, such as pumice, or asbestos, were unsuitable, and why pure nickel was chosen. Various forms of nickel, such as wool and ribbons, were shown, and some experimental evidence was briefly referred to showing that surface alone was not the factor of first importance, but rather surface activity. After reviewing various methods of activation, anodic oxidation was described in detail. Experiments were described showing that the activity of "activated" nickel surfaces, such as turnings, was solely on the surface, but the possibility of the mass of nickel acting as a hydrogen reservoir received some experimental support. The results obtained by the use of activated nickel surfaces were shown by curves. The rate of hydrogen absorption, as plotted on curves, gave results similar to those published by other workers using powder catalysts. The course of hydrogenation, as measured by the analysis of samples taken at intervals, was shown to vary with the manipulation of the operation.

A small model plant holding 5 lb. of oil was shown on the screen, and an example typical of a number of trials carried out in this plant was given; ground nut oil was run through continuously for 77 hours, leaving the plant at the rate of 5 lb. per hour with an average iodine value of 57–58, without any appreciable loss of activity on the part of the nickel, a sample of which as taken from the plant was shown.

Reaction between Ammonia and Sodium Hypobromite

A paper, the joint work of Mr. D. R. Nanji, M.Sc., and Mr. W. F. Shaw, M.Sc., was read by the former on "The Reaction between Ammonia and Sodium Hypobromite—on the unreliability of its application for the quantative determination of nitrogen." When ammonia was added to an excess of an alkaline solution of sodium hypobromite at the ordinary temperature it was decomposed. That this reaction was not the only one that occurred had not been recognised by certain investigators since it had been suggested as the basis of volumetric methods for the estimation of ammonia. The majority of these methods depended on the decomposition of the ammonia solution by adding it to an excess of standard sodium hypobromite, the excess of the latter being determined after acidification and addition of potassium iodide by titrating the liberated iodine with a standard solution of sodium thiosulphate, the reaction being represented by the following equation:—$NaOBr + 2HI = NaBr + H_2O + I_2$.

The authors had submitted the action of hypobromite on ammonia to a searching investigation, bearing in mind the observations of other workers, and the results of their experiments proved that no method on this basis was sufficiently accurate for the estimation of ammonia.

The authors adopted a modified procedure to determine the excess of sodium hypobromite, the method employed being based on the well-known reaction between hypohalogenites and arsenious acid—$2\ NaOBr + As_2O_3 = As_2O_5 + 2NaBr$.

To the solution containing the excess of sodium hypobromite was added in excess an approximately 2 per cent. solution of pure sodium bicarbonate, and subsequently in excess a standard solution of sodium arsenite. The solution was then neutralised with dilute sulphurous acid, using methyl orange as indicator. It was then again rendered alkaline with 2 per cent. sodium bicarbonate solution, and the excess of the arsenite titrated with standard iodine solution, using starch as indicator. The object of neutralisation was to remove any normal carbonate formed by the reaction of sodium bicarbonate with the free alkali in the hypobromite, before titrating with iodine. This method of determining hypobromite was found to be accurate, and it gave results well in agreement with those obtained when acidified potassium iodide was added to the hypobromite, and the liberated iodine titrated with thiosulphate. The authors submit they are justified in advocating the rejection of the hypobromite method of estimating ammonia when the greatest possible accuracy is required.

Acetone and Ethyl Alcohol

Mr. J. H. Bushell, B.Sc., read a paper on "The Estimation of Acetone and of Ethyl Alcohol in a mixture of the two." The object was to estimate these substances in comparatively small quantities in the products of fermentation by various bacteria. The method used by Northrop and his co-workers for the estimation of alcohol by oxdising by potassium dichromate and sulphuric acid for 45 minutes at 100° C. in a stopped bottle, and then estimating the unreduced dichromate and finally correcting for the acetone, was criticised as not being one of the simplest or most accurate of operations. The iodoform reaction was not quantitative when using caustic soda. For this reason the iodine had to be standardised against standard acetone—alcohol solutions having the proportion of acetone to alcohol approximately that of the solutions under investigation. Another difficulty was the fact that it was not known whether both the alcohol and the acetone were completely oxidised by dichromate under these conditions. Then, again, the conditions of oxidation were not of the simplest.

The present author preferred an estimation of the specific gravity of the mixture which together with the acetone content gave by calculation the alcohol present. For this calculation acetone gravity tables up to 1 per cent. had to be constructed.

The method may be summarised as follows:—A known volume of the liquid under investigation is made slightly alkaline with soda and distilled, the distillate being made to a definite volume. The gravity of this solution is then taken, and the acetone estimated by the method of J. Rakskit. By means of the acetone tables, the gravity of the acetone present can be found, and from this and the gravity of the mixture the gravity of the alcohol is estimated. The percentage of alcohol is then found from alcohol tables.

Royal Institution Lectures

The lectures at the Royal Institution after Easter will begin on Tuesday, April 10, when Sir Arthur Keith will deliver the first of a course of four lectures on the machinery of human evolution. On the following Tuesday afternoons there will be two lectures by Dr. A. C. Seward on "The Ice and Flowers of Greenland and the Arctic Vegetation of Past Ages," and three by Professor Flinders Petrie on "Discoveries in Egypt." On Thursday afternoons, commencing April 12, Dr. A. O. Rankine will give two lectures on "The Transmission of Speech by Light"; Professor MacGregor-Morris three on "Modern Electric Lamps"; Dr. E. G. Coker two on "Engineering Problems Solved by Photoelastic Methods," and Sir William M. Bayliss on "The Nature of Enzyme Action." On April 14 the Saturday Afternoon lectures will begin with two by Sir Owen Seaman on "The Sonnets and Ballads of Dante Rossetti," followed by two by Dr. Leonard L. B. Williams on "The Physical and Physiological Foundations of Character"; three by Mr. John McEwen on "Dance Music, Harmonic Evolution and Musical Education," with musical illustrations, and two by Dr. Arthur Hill on "The Vegetation of the Andes and the New Zealand Flora." The Friday evening meetings will be resumed on April 13, when the discourse will be delivered by Dr. W. H. Eccles on "Studies from a Wireless Laboratory." Suceeding discourses will probably be given by Mr. W. J. S. Lockyer, Mr. C. V. Boys, Professor Soddy, Professor W. A. Bone, Mr. W. M. Mordey, Sir Aston Webb, Professor Lorentz, and Miss Joan Evans.

The World's Chemical Supplies

German Professor's Review of Changed Conditions

PROFESSOR ARTHUR BINZ (Professor of Chemistry in the Agricultural College, Berlin), in reviewing, in the *Manchester Guardian Commercial*, the changes in the world's chemical supplies, bases his calculations on the value in millions of gold marks of the exports of the electro-technical industry (which is dependent on the chemical industry owing to its consumption of pure copper), namely :—

	1913.	1921.
U.S.A.	9·5	34
Great Britain	13	24
France	3·6	4·6
Switzerland	2·1	4·8
Germany	30	12

These show that America's foreign trade has expanded greatly, Great Britain has almost doubled her exports, France and Switzerland have increased theirs, while Germany's exports have dwindled to little over one-third.

The position of Germany's large-scale inorganic industries (he writes) is seriously undermined by their inability to obtain cheaply and in sufficient quantities such products as lime, soda, caustic soda, and sulphuric acid. Germany lost some 57·2 per cent. of her total coal resources in Lorraine, the Saar, and Upper Silesia, and there is a shortage of fuel for lime-burning. Last year agriculture only obtained 14 per cent. of the lime needed for fertilisers—a very serious matter. The consumption of brine for the production of soda fell from 22·7 million hectolitres in 1913 to 10 million in 1920, owing to the loss of the salt springs of Alsace-Lorraine. It is true that the soda works in Central Germany are now well stocked, but the totally inadequate railway service greatly hinders the transport of soda to consumers. Soda is used, apart from such purposes as the softening of boiler water, for the production of soap and caustic soda, and the result is a shortage of these. Caustic soda could also be produced without soda by the electrolysis of sodium chloride (common salt), but as chlorine, one of the poison gases used during the war, is liberated in the process, part of the plant has had to be destroyed under the Peace Treaty regulations, so that it is impossible to produce a sufficient quantity of caustic soda by this process.

In addition to coal, Germany has lost iron, lead, and zinc ores in Upper Silesia. Zinc ore is an important item in the production of sulphuric acid, which is the basis of the production of almost every other chemical, and the production of sulphuric acid has decreased between 1913 and 1920 by 54·7 per cent. Sulphuric acid is needed for the manufacture of the superphosphates, which are so important for fertilising, and as the Thomas phosphates derived from the ironfields of Lorraine are now also lost to Germany the supplies of phosphoric acid to German agriculture have fallen from 630,000 tons in 1913 to 268,000 tons in 1920. The supplies of nitrogenous fertilisers have been maintained, thanks to the use of synthetic ammonia and the utilisation of Bavarian water-power for the production of calcium cyanamide.

Sodium sulphate, which is produced from sulphuric acid and salt, is used in the manufacture of glass, as are also salt, soda, coal and lime, and the production of glass has suffered accordingly.

The shortage of the inorganic chemicals is also disastrous to the organic large-scale industries. The output of coal tar sank from 1,152,772 tons in 1913 to 830,845 tons in 1920 in the cokeries, and from 400,000 tons in 1913 to 270,000 tons in 1921 in the gasworks, again owing to the loss of the coalfields. The cokeries supplied 260,000 tons of benzol in 1910, and only 181,000 tons in 1920, although the demand had increased, for the use of benzol is not now confined to the manufacture of aniline dyes ; it is also used in conjunction with alcohol for the driving of motor vehicles, on account of the high cost of petrol.

Vegetable tar ranks next in importance to coal tar, but the supplies of timber available for the charcoal industry were less than 10 per cent. of its requirements. Consequently, there was a great scarcity of pyroligneous acid and methyl alcohol, both of which are necessary for the manufacture of dyes and drugs. These causes, combined with the expropriation of German patent rights under the Peace Treaty, have reduced the profits of the German dye industry, reckoned in gold marks, to one-third to one-quarter of pre-war.

The following table, from the *Board of Trade Journal*, shows the changes which have taken place in the British chemical industry :—

	Total Imports.	Exports of British Manufactures.
	(000's omitted.)	
Declared values, first quarter of		
1913	£3,195	£5,217
1922	£2,663	£5,265
Estimated values for 1922 at mean rates for 1913	£1,444	£2,948
Ratio of 1922 quantities to 1913	45·2 per cent.	56·5 per cent.

Exports of—

	1913. cwts.	1922. cwts.
Ammonium sulphate	83,000	41,000
Sodium compounds	1,619,000	2,167,000
Painter's colours	562,000	279,000

The fact that the total British imports had fallen in 1922 to 45·2 per cent. of 1913 points to a growing emancipation from foreign supplies. The exports of the very important sodium compounds have at the same time increased. Norway now no longer buys soda from Germany, but mainly from Great Britain, which covered almost 50 per cent. of the Norwegian demand in 1920. The rest came from Belgium and the United States of America. Great Britain also ranks first among the importers of sodium chloride, caustic soda, and sodium sulphate into Norway, which uses large quantities for the production of saltpetre and cellulose.

A noteworthy event in 1921 was the erection of the works of Brunner, Mond and Co., at Billingham, for the production of synthetic ammonia. There is not likely to be any foreign competition in this branch of the inorganic industry, as every country, and especially Germany, is fully occupied in covering the needs of its own agriculture.

Among the important chemicals of which the British exports exceeded the imports in 1921 were : Sulphuric acid, hydrochloric acid, soda, caustic soda, aluminium sulphate, sal-ammoniac, ammonium sulphate, bleaching powder, borax, ether, ethyl acetate, glycerine, sodium cyanide, chloroform, tar oils, toluol, carbolic acid, salicylic acid, naphthalene, and organic products for photographic purposes. Salvarsan also, a chemical which was not produced in England before the war, now appears on this list. The protective measures adopted in the interest of such new manufactures are well known. The production of essential oils seems to be thriving for the same reason. The issue of the familiar battle of the dyestuffs is still in doubt.

In the British Colonies there have been many new flotations. In Australia the Newcastle steelworks have built coke ovens, and it is hoped to produce a million gallons a year of benzol for motors. The limestone in North West Bay, Tasmania, is being worked for carbide. In Canada the production of liquid chlorine has been begun in connection with salt works in Ontario. The production of acetic acid from carbide has so increased that the exports to the United States have grown from 27,743 lb. in 1914 to 2,862,068 lb. in 1920. In the South African Union there are plans for the production of sodium cyanide, as all the raw materials required are to be found in the country. The extraction of gold will so be made independent of imports from Europe.

The statistics of production of the United States are as follows for the principal chemicals, in 1,000 tons :—

	1914.	1920.
Sulphur	418	1,879‡
Sulphuric acid	4,071	5,600
Ammonia	187	303‡
Soda	980	1,238
Caustic soda	203	382
Bichromate	11·8	26
Tar (million gals.)	135*	361
Benzol (million gals.)	2·5§*	8·7§
Benzol (million gals.) refined	—	17
Ammonium sulphate (mill. lb.)	99*	676
Formaldehyde (million lb.)	8·4	19·7†

* 1912. † 1919. ‡ 1921. § Crude.

The production of artificial silk was estimated at 1·6 million pounds in 1913 and 15 million in 1921. The sulphur exports were 110,022 tons in 1914, and 285,762 tons in 1921 ; they went to Europe, Canada and Australia, and are competing strongly

with the Spanish pyrites and the Sicilian sulphur. America is the only country with ample supplies of caustic soda. Ammonium sulphate was an import article in 1914; now exports are substantially in excess of imports. In dyestuffs America competes with Germany, particularly in China and Japan. The American production of dyestuffs fell 56 per cent. from 1920 to 1921. Out of its large profits the American chemical industry provides 70 million dollars a year for scientific research.

French exports of chemicals were 211 million francs in 1913 and 857 millions in 1921. In 1922 the aniline dye industry covered nearly 85 per cent. of the home requirements, against only 5 per cent. before the war. Imports from Germany were 4,000 tons in 1920, and 339 tons in 1921.

In Alsace France has obtained 17 potash mines. Germany still has 206, but French competition is felt, especially in the Norwegian and American markets. The fall of the German soda industry has driven German consumers to buy dear Alsatian material. The French ammonium sulphate production only covered one-fifth of the consumption in 1922, but will increase in consequence of the agreement between the French Government and the Badische Anilin und Sodafabrik in regard to the production of ammoniac by the Haber-Bosch process.

The French artificial silk industry is also of growing importance, and the thriving perfumery industry has gained at the expense of England through the British alcohol duty. There are beginnings of a chemical industry in the French Colonies. Chlorates are to be manufactured for explosives in Algiers, and a bromine factory was set up in Tunis during the war. A large soda factory was recently opened at Haifong, in Indo-China.

Swiss chemical production increased greatly during the war. Aniline dyes exported in 1913 were 20 million francs in value, and in 1920 211 million francs. The electro-chemical industry benefits from the increase of Swiss water-power from 350,000 to 550,000 kilowatts between 1914 and 1920.

Poland has obtained through the war half of the coke production of Upper Silesia, the whole of the iron ore extraction, 85 per cent. of the zinc and lead ores, and German and Austrian salt supplies. In Posen and Pömmerellen she has obtained 55 chemical factories.

The Russian exports of chemicals were valued at 16·3 million gold roubles in 1913, and half a million in 1921. The Don soda works are again delivering substantial quantities of soda, caustic soda, and chloride of lime, and efforts are being made to revive other branches of the industry with the aid of Protectionist tariffs.

Scandinavia plays an important part through its water-power. The Northern Hydro-Electric Nitrogen Company exported in 1921 17·3 million tons of sodium nitrate and 81·9 of calcium nitrate, against 14·8 and 46 million tons in 1916.

Japan has in vain sought to set up an aniline dye industry behind a Protectionist wall, but has had better success with caustic soda and bleaching powder, which she exports to China. She has conquered the Indian market for matches from Sweden. Sulphuric acid and nitric acid are produced in China, and as this requires a considerable technical knowledge it may be assumed that other chemical manufactures will follow.

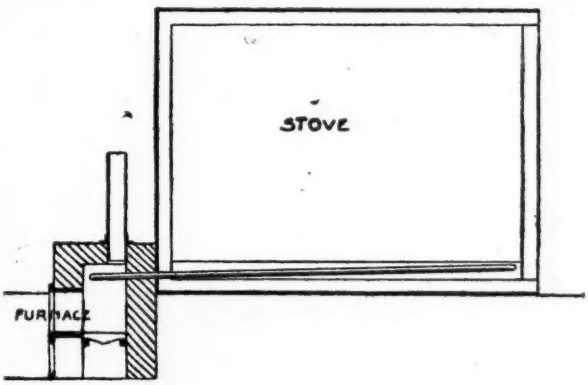
This survey shows two main tendencies at work, the fight of each against all for access to raw materials and for markets for manufactures, and the fight of all against the niggardliness of nature in such directions as the production of artificial manures, of means for stamping out plant pests, the utilisation of water-power to save coal, the economical use of coal, the discovery of substitutes for important but limited materials, such as Chile nitrates and mineral phosphates. The task of European reconstruction is more hopefully to be approached by means of these latter methods than by the fight of each against all.

New Source of Phosphates in Japan

RECENT researches made by experts of Tokio Imperial University have proved the Hokudaito Islands, in the Luchus, Japan, to be a rich source of phosphates. It is reported in a local vernacular paper that the yearly production of ore will be worth as much as Yen 15,000,000 at least. The yield, continues the paper, will well suffice to meet the demand in Japan, if properly dealt with, so that no importation of the ore would be necessary.

The Stirling Stove

PARTICULARS supplied respecting the Stirling stove, manufactured by G. F. Wells, of Bath Street Ironworks, Sheffield, show several features which should be of interest to manufacturing chemists and others. The stove itself is built in the usual manner, either with double walls of sheet steel and packed with non-conducting material or with cavity brick walls, but the method of heating is the most interesting feature. A number of special steam tubes are fixed in the bottom of the stove, the exact number being governed by the temperature required, and these tubes project through the back wall of the stove into the furnace, which burns coke. Each tube is a separate unit of the length required, and is made in the following manner:—One end is first welded up and thus sealed, after which a certain small quantity of water is put in, the amount being governed by the length of the tube, but never sufficient to fill it. A vacuum is then drawn by a special process, and maintained whilst the other end is welded and sealed. All these tubes are fixed in the stove



at an inclination to the horizontal, and the lower ends containing the water are arranged in the furnace. Upon lighting the fire the water is boiled and each tube is filled with steam. As this condenses, the water runs back to the furnace and is again converted into steam, the process being continuous so long as the fire is burning. Very high temperature steam tubes are obtained in this way without requiring a steam boiler, superheater and water-feeding mechanism; in fact, no attention is said to be required beyond the usual attention to a coke fire.

It is claimed that the cost of running these stoves is less than that by any other method, and less than one-quarter of the cost of gas required to give the same temperature in the stoves. Another advantage is that there is no danger of sulphur or gas fumes entering the stove and possibly damaging the material. Temperatures up to 500° F. can be obtained, and the stove can be ventilated for drying, or used for heat treatment only as may be desired, and almost any size can be supplied. For colour drying, all tubes and ironwork can be supplied galvanised, if required, in order to avoid any possibility of rust getting into the trays. The firm offer to supply further particulars to any who may be interested in the subject.

A Directory of the Glass Industry

THE Society of Glass Technologists has issued a directory of some 380 pages containing particulars as to the addresses, management and products of various glass manufacturers and dealers, whether of crude or worked glass. The book also covers manufacturers of glass-making machinery and sundries, and particulars relating to trade unions and associations connected with the industry are included, while there is also a list of publications, and a number of advertisements. The title is the "Directory for the British Glass Industry, 1923," and the price is 7s. 6d., or to advertisers and to subscribers of the society it is 6s., bound in cloth. The whole forms a fairly complete and useful handbook for those in any way interested in the industry.

Phosphate Beds in Morocco

His Majesty's Consul at Casablanca (Mr. C. E. Heathcote-Smith, O.B.E.), has forwarded to the Department of Overseas Trade the following interesting report on phosphates in Morocco :—

Extent of Moroccan Phosphates

By the discovery of rich and vast phosphate beds, Morocco has become a potential factor of economic importance. She is credited with the possession of deposits rivalling in extent those of Florida, and in content those of any other country in the Eastern Hemisphere. Thus the Oued Zem-El Bouroudj beds (situate 150 kilometres south of Casablanca) cover a district of some 75 kilometres in length and from 5 to 35 kilometres in breadth. They consist of horizontal layers several metres deep, lying practically on the surface, covering an area of some 400,000 acres, and composed of a fine sand which is nothing other than phosphate of lime of so high a percentage (73 to 78 per cent.), that Florida alone can show similarly rich deposits. Even the beds other than at El Bouroudj also contain a high percentage of phosphates varying from 68 per cent. to 72 per cent. As for their quantity, estimates vary from "many millions of tons" to "hundreds of millions." It has been calculated that even if the beds were exploited at the rate of several millions of tons annually, centuries will elapse before their exhaustion.

Potential Markets

In pre-war days (1913), the world's production was under 7 million tons per annum, and Europe's consumption was over 4 million. The United States of America produced 3½ million, Algeria and Tunis 2½, and Europe and Oceania half a million each. The supplies of Europe were furnished as to 2½ million by Algeria and Tunis and as to 1½ by the United States of America. Obviously, therefore, Morocco's market is to be looked for in the Old World—but unfortunately in some competition with Algeria and Tunis. Already Europe is taking again her pre-war quota of 4 million tons. The exceptional percentage of phosphates contained in the Moroccan beds should, however, assure for them a ready market even when competing against other phosphates, provided production and shipment expenses be kept sufficiently low.

Apart from the European and other overseas consumers, the soil of Morocco itself is in many districts badly in need of a good fertiliser, so that agriculture—the main wealth of this essentially agricultural country—stands to gain considerably from the presence of these beds.

Experiments made locally have shown that fields in Morocco treated with superphosphates have yielded 45¼ cwt. per hectare (2·471 acres) as against a yield of 27½ cwt. without the use of phosphates : this represents an increase of 60·8 per cent.

Necessary Conditions of Exploitation

For the Protectorate to obtain the fullest advantages from these "untold riches" hidden in her soil, the immensity of which was only properly grasped by the French Authorities in 1919–20, various conditions for their exploitation became essential.

They may be summarised as : (1) Production in large quantities ; (2) Production and handling at a minimum cost ; (3) Rapid means of production ; (4) Rapid means of transport ; (5) Adequate means of shipment ; (6) Local factories for the transformation of the phosphates into superphosphates.

When the Protectorate Authorities realised that phosphate deposits might alter the whole economic future of Morocco, their first step was to publish the Decree of January 27, 1920, whereby the entire exploitation was made a State monopoly. The actual enterprise is conducted as an industrial concern, under a Board of Management, whose head-manager is M. Beauge, formerly of the Tunisian Gafsa Phosphates Co., while the shareholder in this concern is the Protectorate ; consequently the board of directors is composed almost exclusively of officials, while the enterprise is worked on commercial lines free from official restraint.

The exploitation of the phosphates of Morocco has formed the subject of much adverse comment in the local Press. It is not certain, however, whether the advantage of State participation has not outweighed its drawbacks, for the authority requisite to build railways and provide port facilities might have long been lacking had private interests only been concerned. This is, however, a debatable point, and the present facts shall speak for themselves in so far as the State activities are concerned. At present 7 square kilometres of mines are being exploited, and the phosphates extracted are dried in a special machine which has a daily capacity of 30 tons.

The official exploitation has now been in progress for about two years and as against the potential millions of future years, actual deliveries were : in 1921, 8,230 tons ; in 1922, 80,583 tons. All except 37 tons of the above are being exported. These figures appear relatively full of promise, although locally they have aroused little enthusiasm, and the official Office of Phosphates defends them by stating that of the three principal phosphate companies (A, B and C) of Algeria and Tunis A only produced as much as 81,800 tons in its fifth year of working, B 65,000 in its third, and C 82,000 in its second

A narrow-gauge railway has been built between Casablanca and Oued-Zem—El Bouroudj, and it is owing to this that the increase in exports has been possible. A broad-gauge railway, now under construction, should be completed by October, 1923, and great hopes are based on its utility and the economies it will effect.

Buyers have all expressed satisfaction with the high percentage contained in the phosphates sold them, and the supplies now available from Morocco, Algeria, and Tunis provide phosphates in all the varying percentages that may be in request.

In respect of the encouraging results that the Office of Phosphates claims to be the consequence of its exploitation the local Press offers some criticisms.

Prospects of the Industry

The Phosphate Office has assured itself of markets for its present output and has hopes of increasing its exportation figures by 200,000 tons each year. Thus the (in round numbers) 100,000 tons exported in 1922 would become 300,000 in 1923—and by 1927 1,100,000 tons. The United Kingdom is already a purchaser.

A superphosphate factory with an annual capacity for treating 15,000 tons of phosphates is now being erected at this port and will be completed this year. It will produce 24,000 tons of superphosphates per annum. Most of this will be exported, as there is so far but little local demand. The pyrites necessary are brought from Tharsis and Rio Tinto through Huelva (Spain) to Casablanca.

It is calculated that for fertilising purposes, 300 kilograms of "super" per hectare (2.471 acres) is necessary : so that a local consumption of 1,000 tons would suffice for more than three thousand hectares. The total demand locally barely reaches this figure.

North African Phosphate Industry

The Department of Overseas Trade has lately received an important report on the output and position of the various North African phosphate companies during recent years, from the Commercial Counsellor at Paris which states that in 1913 the world production of phosphates amounted to 7 million tons, of which North Africa contributed 2,486,000 tons, viz. : (1) Gafsa (founded in 1897), 1,351,000 tons ; (2) Dyr (founded in 1899), 170,000 tons ; (3) Tunisiens (founded in 1907), 362,000 tons ; (4) M'Zaita (founded in 1910), 93,000 tons ; (5) Constantine (founded in 1912), 200,000 tons.

The balance was produced by various small companies, but it may be mentioned that the output of the Rebiba-Maknassy-Gouraya group, in which the Compagnie des Phosphates Tunisiens was interested, amounted to 120,000 tons. In 1913 Europe consumed 4,413,000 tons of phosphates, of which 2,345,000 tons were supplied by North Africa, 1,618,000 tons by America and 450,000 tons by France and Belgium.

The situation of the North African phosphate companies was completely transformed by the war, notably as a result of the closing of the Central European market, the difficulties in securing a sufficient supply of labour on account of mobilisation and the reduced consumption in neutral countries. The companies also suffered from the submarine campaign. The scarcity and cost of freight was such that the output of the Gafsa company in 1917 fell to a quarter of the pre-war figures, although in 1916 it had made a great effort to increase production. It was consequently obliged to reduce production in order to avoid an accumulation of stocks.

After the armistice the companies still suffered from the scarcity of freights and the difficulty of recruiting labour. Moreover the French Government regulated the trade in phosphates in order to assure sufficient supplies for French agriculture. In 1920, as a consequence of this situation, North Africa produced only 1,970,000 tons of phosphates, as against an American production of over 4 million tons. At this date there was a considerable rise in the price of phosphates, which were sold at more than 100 francs a ton instead of 30 francs a ton in 1913. This higher price was only applicable to sales to foreign countries, as France enjoyed a special rate.

Some fears have been expressed that the recovery of the Alsatian potash field and the possibility of an increase in the production of nitrogenous fertilisers may have an unfavourable influence on the North African phosphate companies. The competition of the phosphate field in Morocco must also not be neglected, although the difficulties of transport and the want of ports for shipment seem likely to prevent production on a large scale within 4 or 5 years. It is expected that in 1924 about 300,000 tons of phosphates will be despatched from Morocco and one million in 1928, whereas Algeria and Tunisia should produce from 3½ to 4 million tons towards the same date. On the whole the future of the North African companies may be regarded as promising.

The Sulphur Industry of the World

Sources of Supply

For some years Italy has been the greatest exporter of sulphur. During the past three years, however, according to *Chemical and Metallurgical Engineering*, the United States has become the chief source of supply, owing to the exceptionally low cost of production. Japan now ranks third in importance as an exporter of this commodity. Although free or native sulphur is devoted to many different uses, it has been estimated that more than half the consumption is in the manufacture of sulphuric acid. Large quantities are also used in the sulphite process of digesting wood pulp for paper manufacture, as a fungicide for grape vines and hops and as a fertiliser, insecticide, fumigant and sheep dip. Moreover, the vulcanisation of rubber, the manufacture of matches, explosives, dyes and cements, as well as photography and medicine, all draw heavily upon the sulphur supply.

During the war Japan, which next to the United States and Italy is the chief producer and exporter of sulphur, greatly increased its output. A record of 116,000 tons was reached in 1917, as compared with an average of 49,000 tons in previous years. Practically all the sulphur produced in Japan was exported previous to 1917, as there is normally very little demand for it in the home market. Since the war, however, both production and exports have decreased in large measure.

Japanese Exports Decrease

Of the total Japanese sulphur exports, 45 per cent. went to the United States, the largest consumer, prior to the war. For the most part, these shipments were used in the paper-making industry of the north-west. The difference in freight charges in shipments across the Pacific, in comparison with those from Louisiana and Texas, is the cause of the large amount still imported from Japan. The opening of the Panama Canal, however, has made the Gulf ports easily accessible to the Pacific Coast and in future the American producing regions can doubtless satisfy the home market. Australia had also relied upon Japan previous to the war for sulphur supplies, as she imported 35 per cent. of the total Japanese output. However, in 1920, the last year for which figures are available, Japan exported the larger part of her reduced output to India, replacing almost entirely the Sicilian product.

American sulphur has recently been exported in large quantities. Previous to 1917, an average of 60,000 tons was shipped annually to foreign markets. Of this amount, 88 per cent. went to three countries alone—45 per cent. to France, 31 per cent. to Canada and 12 per cent. to Germany. In the first nine months of 1922, statistics show that sulphur exports from the United States amounted to more than 400,000 tons, and although each country imported a smaller quantity than previously, the export market has expanded so that these three countries used only 55 per cent. of the total amount.

Sicilian Sulphur Industry

A British Enterprise

The Italian sulphur industry is passing through a serious crisis. Alternate periods of stagnation and high prices characterised the industry up to 1895, the last serious crisis when the price of sulphur dropped to 5 lire per quintal f.o.b. This state of affairs also proved injurious to the British chemical industry, says a correspondent of the *Manchester Guardian Commercial*, causing the selling price of recovered sulphur to be reduced to an absurd level. In consequence, a group of English financiers, interested in the chemical industry, decided to form a company to stabilise the price of sulphur.

In this way the Anglo-Sicilian Co. was formed, and five-year contracts were made by which the company undertook to purchase from the producers the greater part of their output, the contracts to be renewable for further periods of five years each. The company did excellent business, but on the expiration of the contracts a fresh development led to their not being renewed. This was the beginning of the production of sulphur in America by means of the Frasch method. The cost of production of the American sulphur was and is still considerably below that of the Sicilian product.

The effect of competition began to be felt, and in 1904 the Anglo-Sicilian Sulphur Co. was forced to make an agreement with the American producers which lasted until 1906, when the company decided to go into liquidation. The Sicilian producers were unable to form a syndicate among themselves, and petitioned for a producers' syndicate enforced by law. As a result the Consorzio Obbligatorio per l'Industria Zolfifera Siciliano was formed in 1906 for a period of twelve years. Real benefits were derived from the Consorzio, which controlled sales up to 1914, when the war began.

In the meantime American production was increasing, and in 1908 the Consorzio Zolfifera made an agreement with the American Union Sulphur Co. which lasted up to the end of 1913, by which the world consumption was divided into two equal parts. Owing to the war prices gradually rose, and in 1918, the end of the first term of the Consorzio, it was agreed to extend it until 1930.

A Hopeful Position

The spring of 1921 marked the beginning of the present crisis. In 1913 the Freeport Sulphur Co. started operations at Freeport, in Texas, and the Gulf Texas Co. in 1915. It is estimated that stocks of sulphur in America amount to about two million tons. On the other hand, Sicily produces about 250,000 tons annually, and has stocks of about 300,000 tons. American competition has invaded not only the distant markets, but also those of the Mediterranean, very materially assisted by the fall in freight rates which began in 1921. It must not be assumed, however, that the position is hopeless. Competition among the three American companies is such that in some markets they have no longer a margin of profit, in others they are selling below cost, and it must be remembered that American sulphur is inferior in quality to the Sicilian.

The various issuing banks had subsidised the Consorzio Zolfifera by advancing funds on the security of sulphur recovered and warehoused, but the slump in sales made it impossible for the Consorzio to repay these loans, and, as a result, the banks would no longer give assistance. The producers were then deprived of the necessary funds to enable them to carry on and were forced to close down, thereby throwing 30,000 men out of work. The Government, after prolonged investigation of the whole question, authorised an issue of bonds to the amount of 100 million lire on the security of the sulphur stocks owned by the Consorzio, and guaranteed by the Government itself. In this way the Consorzio has been enabled to repay the issuing banks, and, on the one hand, the Government is guaranteeing the payment of the bonds and has authorised the Consorzio to sell its stocks at any price in competition with America. On the other hand, the workers are now fully alive to the fact that costs of production must be reduced to meet present conditions and have consented to a graduated reduction of wages.

Negotiations have taken place with delegates of the three American companies, and the situation thus modified will certainly influence the representatives of the American branch of the industry to come to an understanding which will safeguard the interests of both sides.

C

Benn Brothers, Ltd. : Ernest Benn, Ltd.

Company Divided into Two Sections

BENN BROTHERS, LTD., is henceforth to be divided into two companies. The division is merely a matter of convenience or expediency. It is designed to promote efficiency, and to facilitate working; in no other sense is there any real division at all. The periodical part of the business will be conducted under the old name of Benn Brothers, Ltd., while the book publishing section will assume the title Ernest Benn, Ltd. The directorate of the two companies will be practically the same, and no change in proprietorship will take place.

The explanation is that the business of Benn Brothers, Ltd., was getting too big. There comes a point in any business when mere size is an incumbrance. The attempt to concentrate a vast mass of business into one set of ledgers involves so much in the way of systems, regulations, red tape, reference, etc., as to absorb those economies which are supposed to come from large scale production and large buying. We know how the Government Office becomes an object to itself, and tends to function for its own benefit and to forget the people outside for whose services it was supposed to be established. The same tendency is noticeable in every large business, and the problem is to focus the mind of every individual in the business, not on his or her colleagues, or on the office system, or on the relation of his or her work to the work of a neighbouring department, but to get every mind in a business exercising itself to see how it can more directly and effectively render service to the customer outside. People sometimes wonder how it is possible for the small shopkeeper to exist in face of the competition of the big modern establishments. The answer is to be found in the personal touch, the absence of routine, the knowledge of individual tastes and fancies, which can only be secured when a business man and customer are in very close personal relation one to the other.

The division of the great business of Benn Brothers, Ltd., into two parts is an attempt to retain the advantages of great size and to add the undoubted advantages of concentration, specialisation, and, above all, individual interest and attention. The business divides itself very naturally into two; while publishing is always publishing, and a book is a book, there is a world of difference between a book which appears every Friday, and one which comes out once for all. Thus it seems to be right and fitting that the great series of weekly trade journals for which Benn Brothers, Ltd., are known the world over, should be to some extent separated from the production of technical and art books, a department of publishing in which they have always held a prominent place, but which in recent years has experienced enormous developments, and for which still greater and more important developments are contemplated.

The personnel of the board of directors of Ernest Benn, Ltd., will be very largely the same as that of the present company. The chairman will be Sir Ernest J. P. Benn, Bart., C.B.E., with whom will be associated Mr. H. P. Shapland, A.R.I.B.A., chairman of the Design and Industries Association, and Mr. C. E. Hughes. The important addition is Mr. Victor Gollancz, who has for the past two years occupied the position of manager of the Book Department. It is to Mr. Gollancz that is due the credit for the remarkable successes in the last few years in the production of fine art books. Such works as Hetherington's "Early Ceramic Wares of China," Hobson's "Ming Wares," the designs for "The Sleeping Princess" by Leon Bakst, books which have opened up a new world to the English publishing market, have marked out Mr. Victor Gollancz as being in the first rank of publishers. The new company has been registered just in time to assume responsibility for "The Players' Shakespeare," which bids fair to take its place as the finest set of volumes ever issued by a British publisher.

The business of Ernest Benn, Ltd., will be the publication of books without any qualification or restriction except that they shall be fine books. Every book published by Ernest Benn, Ltd., will have a mission, a purpose, a definite object, serving some small section of the world's society which requires some specialised knowledge or information or design on some highly specialised branch of human activity. The business is not established in order to go into competition and cut up the market for popular literature with the many great English houses who handle that side of things with such remarkable success.

While the firm are thorough believers in competition and the competitive system, competition is not the purpose of the present business extension. It will be seen, therefore, that the business of Ernest Benn, Ltd., divides itself very naturally into two sections. There is first of all the technical department. Benn Brothers, Ltd., have for many years past been recognised as the leading publishers in certain branches of industrial technology. The "Electrician Series," the "Gas World Series," and books on furnishing and cabinet making are illustrations of this side of the business. Industrial technology is one of the undoubted needs of the world, and Ernest Benn, Ltd., by concentrating effort and directing attention on this need hope to set new standards and contribute very definitely to the advance of science and industry hand in hand. Industrial technology is quite definitely an international field; it is a failure to understand this elementary point which probably accounts for the appalling lack of technical literature in many of the highly specialised branches of industry.

Industrial technical literature has a very important bearing upon the export trade of the country; it is now known that the phenomenal growth of German industries from 1870–1914 was founded upon the enterprise of its publishers backed by its manufacturers. Germany succeeded in giving to the world the impression that she knew rather more about electricity than other people. This was done entirely through technical literature. That impression proved to be the most powerful commercial traveller in turning men's minds to Germany for electrical supplies. America has tried to do the same thing. It is the hope of Ernest Benn, Ltd., that through the publication of the highest class of scientific and technical books they will be able to exercise a far-reaching influence upon the markets of the world in favour of British trade.

The second and equally important half of the business of Ernest Benn, Ltd., will be the issue of works of art, art in its widest sense, first of all the art of the publisher. The business begins its career with "The Players' Shakespeare," a series of thirty of the finest productions which a combination of the highest skill available can evolve. This policy will be carried right through the business. The aim will be that if Ernest Benn, Ltd., is to issue a book that book must be a perfect specimen of the publishing art. Cost of production will never be a vital consideration; that does not mean that there will be extravagance, but it does wipe out definitely and finally any question of economy or price-cutting for the mere purpose of widening the market or approaching the popular. If a book is worth producing by the art side of the business at all, then it must be produced in every detail in the very best possible way. If the "best possible way" is by the use of simple pen and ink drawings and cheap line blocks, then these will be used and the book will be an inexpensive one. If, on the other hand, the purpose in view requires the most elaborate and costly processes of reproduction to be found in any part of the world, then those processes will be employed and the book will be expensive. The cost or selling price will both be subsidiary considerations always. First of all, the books must be just as perfect for their purpose as human knowledge and human ingenuity can make them, and these conditions being satisfied, the price will be as low and economical as is compatible with them.

Ernest Benn, Ltd., thus aspires to do something new, to carve out for itself a position which has not yet been occupied, to add to the good that is in the world as distinguished from the more popular notion of sharing up that which exists.

New Use for Aluminium Sulphate

EXPERIMENTS conducted by Dr. F. C. Coville, a botanist of the United States Department of Agriculture, have disclosed the fact that aluminium sulphate when applied to ordinary soil is an effective and inexpensive method of changing the soil reaction from neutral or alkaline to acid. Where soils have been treated with crude aluminium sulphate marked stimulation of growth of certain plants has been noted.

British Portland Cement Manufacturers

BRIGADIER-GENERAL STANLEY, presiding at the ordinary general meeting on Wednesday, March 28, said that although they had been successful in maintaining the rate of dividend paid in the previous year (10 per cent.), trading conditions generally were exceedingly difficult all through the period. It was to the building and constructional trades that the cement industry looked for its main support, and unless these trades were flourishing they could not expect to prosper. Last year they had to contend not only with slackness of demand, but with increased foreign competition, notwithstanding further reductions of prices. It was a most serious factor that continental manufacturers, whose production cost and freightage charges, when measured in sterling, were in most cases well below theirs, owing to the effect of depreciated currencies, could sell at very low prices in this country and in various export markets. It was much to be regretted that certain public authorities had not hesitated to place contracts for cement and other products with continental manufacturers, whose competition was temporarily assisted by depreciated currencies; these authorities appeared to disregard altogether these abnormal conditions in the endeavour to effect a comparatively small saving at the expense of employment in this country. They could not this year expect much, if any, reduction in the cost of manufacture. Fuel, which played a big part in cement costs, had rapidly advanced in price since the beginning of the year, owing to the continental position, and the prices of other materials, particularly steel and timber, of which they were large buyers for the purpose of making casks, had substantially increased during the past few months. The reductions already made this year in selling prices would certainly exceed any possible saving in manufacturing costs, so that they must look to an increased volume of trade to secure adequate profits. In America and Canada concrete roads had long since passed the experimental stage. Thousands of miles were constructed of this material, without any bitumen or any other form of surface than a light covering of tar, and had been in satisfactory use for some considerable time. Some advance had been made in this country, but Government Departments and public authorities were very conservative in their views, and indulged in prolonged criticism and experiment before embarking upon anything new. However, progress was being made, and they looked forward to concrete roads and to renewed activity in the building trades for an increased outlet for their product in the near future.

British Aluminium Co.

MR. A. W. TAIT, presiding at the ordinary general meeting of the British Aluminium Co., Ltd., on Wednesday, March 28, said that the net profit for the year was £229,235, compared with £221,506 in the previous year. The trading profit was £195,231, against £183,041. The increase, though small, was satisfactory, considering the great difficulty of the times. The year started with the demand for the metal at a low point, and their aluminium works in Norway and one of their alumina works in this country were closed down. The position beginning to improve, the alumina works were restarted early in 1922, and in May the works at Vigelands, Norway, were reopened. As the demand continued the output at the works in Scotland and at Vigelands was gradually increased, and brought up to full production last autumn. The small aluminium works at Strangfiord, Norway, were put into operation on January 1, 1923. Trading conditions throughout had been abnormal, and, owing to competition, prices were low for manufactured metal as well as ingot. In the sheet trade competition had been very keen in this country and in the East, particularly India, from German rolling firms, owing to the depreciated German currency. In a great measure the company was at present unable to compete in continental markets owing to exchange and other restrictions. Since the beginning of 1923 the demand had strengthened, and all their works were on full production, but the principal contracts taken showed no material improvement in price. There existed a shortage of metal for immediate delivery, but its continuance depended largely upon the continued activity of the motor trade, particularly in America. The present situation was fairly healthy. The improvement in the position had led the directors to take an interest in a company owning two fully-equipped factories in Norway, which, owing to trade depression, had been shut down for some time. One of the works would come into production next month, and it was hoped that conditions might warrant the restarting of the other before very long. The Lochaber water-power scheme had not been proceeded with yet owing to the conditions ruling and the high costs of labour and material. When the board were satisfied that the time had arrived when the work should commence and arrangements could be made for financing the scheme, they would proceed with its gradual development. Nothing further had been done regarding the Orsieres power scheme, and, in view of conditions on the Continent, they might consider it advisable to sell their interest if they could obtain a satisfactory price.

United Premier Oil and Cake Co.

AT the ordinary general meeting of the United Premier Oil and Cake Co., Ltd., in London on Wednesday, March 28, the chairman (Mr. H. Guedalla) stated that the chief subsidiary concerns were Wray, Sanderson and Co., Ltd., J. L. Seaton and Co., Ltd., the Premier Oil Extracting Mills, Ltd., Sowerby and Co., Ltd., and the Universal Oil Co. The various properties and plant had been maintained in a high state of efficiency and the mills were absolutely up to date. Since January they had been kept running regularly at remunerative margins. Business had been entered into which would keep them fully employed for some months ahead, and the prospects for future trade were improving. Costs of production were decreasing, and if these should be still further reduced there was very good chance of once again securing valuable export business.

On the general trade position he had little to add to his remarks of last October. The business was in a position to to take advantage from a revival in many different trades, and there were indications of revival in some of these trades, despite the continuity of a financial policy which must greatly handicap any recovery on a permanent basis. Various factors had contributed to this revival, and they could not be sure at present that it would be of a permanent character. As far as export trade went nothing had transpired which might ameliorate the exchange position, but they could only hope, having regard to the vast and real importance of the unemployment question, that some practical method would be found for dealing with this matter as to the financial position.

Perhaps they had too much money for the present requirements of the business. For this reason they were ready to consider any extension of enterprise which fitted in absolutely with their own business. They had been approached on more than one occasion in this connection, but so far had not felt themselves justified in making any further investment.

A dividend was authorised of 5 per cent., or 1s. per share, on the issued ordinary shares for the year 1922.

Salt Trade Prospects Satisfactory

MR. G. H. COX, presiding at the annual meeting of the Salt Union, Ltd., at Liverpool, on Wednesday, March 28, said that despite a difficult time, the company had made enough profit to justify a dividend on preference and the doubling of the ordinary shares dividend, while the holders of both classes had the satisfaction of seeing their market value doubled. Indications for the salt trade were fairly satisfactory, and, in some directions, the welcome improvement in the country's trade, visible a year ago, had further developed, but not to any great extent. The industry had to bear an unprecedented weight of taxation for 1921-22, which worked out at £16 12s. per head. The incidence of taxation per ton was eleven times the pre-war amount.

Calcium Arsenate for the United States

THE Commercial Counsellor at Washington (Mr. J. J. Broderick) reports that three firms of wholesale druggists in New Orleans are desirous of receiving samples and quotations for the supply of calcium arsenate. One of the firms also desires to import arsenic as well as Paris green. Further particulars, together with the names and addresses of the applicants, may be obtained by United Kingdom firms on application to the Department of Overseas Trade (Room 52).

The American Fine Chemical Industry

Satisfactory Progress

SATISFACTION with accomplishments of the past year and hope for further accomplishments in the future through close co-operation were expressed at the second annual meeting of the Synthetic Organic Chemical Manufacturers' Association, New York, on March 8. In his annual report, Dr. C. H. Herty, president of the Association, said :—

"The constitutional year just ending may well be designated one of the most remarkable periods through which any branch of industry has passed. Faced at the outset with a Congressional investigation, avowedly proposed with hostile intent; engaged for months in a struggle for legislation assuredly protective against a vicious foreign competition; shaken for a while to its very roots by an unexpected governmental attack upon the governmental authorised holding of important patents; bearing throughout this period the brunt of a general industrial depression; surely these have been times to try men's souls. And yet at the close of the year we find the clouds dispersed, our industry enjoying a far larger measure of sympathetic public understanding, constantly increasing cordial relations between producers and consumers, ample contentment with the quality and price of our products and consequent placing of orders which insure prosperous times ahead."

Mr. F. P. Garvan, president of the Chemical Foundation, informed the convention of the accomplishments of the Foundation in the way of public education, of a new spirit of understanding brought about through the careful presentation of the case of America against Germany, of the endowment of research in various institutions of education that this campaign has brought about, and of the necessity which exists for the manufacturers of chemical products to do their share in providing for the utilisation of the results of these efforts on a commercial scale. Speaking of the Ruhr situation, Mr. Garvan pointed out that the recent move by the French was no more than the carrying out of what were considered the unfinished duties of the Versailles Peace Conference. The necessity for American manufacturers to co-operate closely and expand their lists of products, particularly dyes, to include the comparatively few still not made in the States, was emphasised by pointing to the policy of the I.G. of building up profits in America from those materials which were imported to fight against the entire American industry. In other words, the fight from the German point of view was being made by co-operation, and it would be necessary for American interests to adopt similar methods so far as the anti-trust laws permit to offset this.

The Patent Mazuri Strainer

IN the issue of November 11, 1922, of THE CHEMICAL AGE, an article on the above strainer was published, and the numerous important improvements which the manufacturers have introduced recently lead them to claim that it is one of the most effective filters now in use.

The steam cock for cleaning, which in the old pattern was above the filtering cone, is now replaced by a curved pipe and rose jet which is placed at the outlet end of cone and effectively cleanses all particles that may have adhered to the filter. Above the sump is a manhole plate that can be removed in a few moments to change the cones for a larger or smaller mesh as the case may be, the cone being brought out of the body of the filter by the action of removing the plate. The strainer is so built as to resist considerable pressure and the sump directly below the filter receives all the suspended matter that has been filtered from the liquid. The sump can be emptied by a sluice controlled by a valve. The filtering surface is four times the area of the tube, and the resistance to flow is therefore practically nil.

Its use is recommended for anyone taking their water supply from ponds and other sources where the water is not clear, and it is especially useful for soap works, brewery and distillery industries, petroleum and oil works.

This filter and sump is made in all metals, and could be made in glass, if necessary, for the chemical industry, and the cones can be obtained in any size mesh to ensure perfect filtration.

Properties of Metallurgical Coke

American Experimental Plans

EMPLOYING testing methods standardised during the past year, a study is to be made by the United States Bureau of Mines of the operation of blast furnaces in the Birmingham, Alabama, district in relation to the physical properties of the coke used as fuel. Loss by "solution" of coke in the blast furnace stack gases is believed to be detrimental to economical operation. A laboratory test has been devised, by which the relative reactivity of cokes with carbon dioxide may be quantitatively determined. Correlation of test results with those of actual furnace practice will be undertaken during the present year. The work will be conducted in connection with furnaces operating on coke from Alabama, Pennsylvania, and Illinois coal. By means of analyses of gas taken from different parts of the blast furnace hearth, the rate of combustion of different kinds of coke will be determined under actual operating conditions. Results so obtained will be correlated with the physical and chemical properties of the coke as determined by laboratory tests. In co-operation with the Fuel Section of the Pittsburg Station of the Bureau of Mines, the relative combustibility of cokes from Alabama, Pennsylvania, and Illinois coal is being determined in the Kreisinger furnace. Rates of combustion as high as 100 lb. per sq. ft. of grate area per hour are being employed. The influence of the size of the coke pieces is being investigated, gas analyses at different points in the fuel bed are being made, and the relation between tests results and furnace practice will be determined.

In making calculations of the efficiency of operation of a blast furnace, the amount of carbon available for combustion at the tuyeres is taken as the so-called fixed carbon of the proximate analysis. The official determination of volatile matter is made at a temperature of 950° C. Since coke is subjected to temperatures up to 1,800° C. before being burned at the blast furnace tuyeres, there is the possibility that less carbon is actually "fixed" in a condition to reach the tuyeres than is indicated by the ordinary proximate analysis. Experiments are under way by the Bureau of Mines in which the volatile matter of several varieties of metallurgical coke will be determined at temperatures up to 1,700°C.

There is considerable demand in the industries for a small scale apparatus which will determine the character of coke and by-products to be obtained from a given coal. The Bureau of Mines proposes to construct an apparatus capable of carbonising 100 lb. of coal and to calibrate it by testing several varieties of coal on which large scale operating data are available. The physical properties of the coke, its combustibility, and its reactivity with carbon dioxide will be compared with the coke produced by large scale operation. Analysis and yields of by-products will be compared in like manner. The attempt will be made to modify the apparatus, if necessary, so that the coke and by-products produced will be identical in quality and quantity with those produced in actual practice.

Complaint against Chemical Manufacturers

MR. JUSTICE ROMER, in the Chancery Division of the High Court, on March 23, heard a motion by the trustees of the Hull Municipal Hospital, stated to be a collection of buildings used as almshouses, for an injunction restraining an alleged nuisance from noise, smell and vibration, and the actual discharge of tarry substances by Major and Co., Ltd., chemical manufacturers, of Sculcoates. The complaint was that the result of the defendants' operations was frequent strong and unpleasant smells, noises at night, occasional explosions or throwing of tarry matter into the air, which had become more frequent of late. The defence agreed that some of the complaints were serious, and that no one regretted them more than the defendants. They were investigating the cause of the trouble, and suggested that the motion should stand over to see if they could remedy the matter. After further argument, in which it was stated that the defendants' premises had been on their site before the plaintiffs', liberty was given to apply for an early trial of the action.

Experiments in Wood Distillation

Success Claimed for American Process

PROFESSOR O. F. STAFFORD, of the University of Oregon, is reported to have perfected a commercially successful process for the distillation of waste wood by means of which a superior grade of charcoal as well as the ordinary wood-distillation by-products can be obtained. Two large wood-distillation plants on the Atlantic coast were placed at the professor's disposal, and the success of the process, it is claimed, has been completely demonstrated.

The retort used in the Stafford method is a cylinder, 32 ft. high and 9 ft. in diameter. The cylinder is set vertically and the appliances are such that the wood to be carbonized is fed continuously into the top, while charcoal is withdrawn continuously from the bottom. A remarkable feature of the process is that no heat is applied to the cylinder after the process is started, the carbonization of the wood being spontaneous under the conditions which the invention maintains. In previous processes the principal difficulty encountered in the use of small waste wood has been that of transmitting heat to the interior of a mass of finely divided woody material in the retort. Only the portions of this mass in contact with the hot walls of the retort can in any reasonable time reach a carbonizing temperature. The numerous attempts to handle such material have had to do principally with overcoming this difficulty. Formerly the wood used in carbonization work has contained moisture. Professor Stafford experimented with perfectly dry wood. He found that when the dry wood was heated under his process to the temperature at which the charring began, the carbonization went along to completion without further application of heat from outside sources. The process, in short, is exothermic.

The cost of installing a plant under the new plan is considerably less than that of building an oven retort plant of equivalent capacity. It has other advantages, among which are low depreciation and low labour and fuel costs. It has not yet been demonstrated whether the charcoal made under the Stafford process can be used in the iron industry. The charcoal produced from small waste wood would have to be briquetted for direct use in a blast furnace.

Sulphuric Acid and Ferric Sulphate Solutions

PREVIOUS laboratory work at the South-west experiment station of the Bureau of Mines, Tucson, Arizona, has demonstrated the importance of SO_2-oxidation of ferrous iron for the making of a leaching solution to contain both sulphuric acid and ferric iron. This solution can be used as a leaching agent for the recovery of copper from oxidised ore or sulphide ores, or a mixture of these ores. The presence of SO_2 accelerates the oxidation of ferrous iron, and the percentage of SO_2 present affects the rapidity with which the ferric iron breaks down for the formation of sulphuric acid. When the concentration of the SO_2 entering or bubbling through the solution containing ferrous iron is less than half of one per cent., the formation of ferric iron proceeds more rapidly than does the breaking down of the ferric iron to form sulphuric acid. Under these conditions, it is practical to change all of the ferrous iron to ferric iron with the formation of some sulphuric acid. As the percentage of SO_2 in the entering gas increases, more of the ferric iron is broken down so that a concentration of SO_2 can be obtained which will effect a complete reduction of all the ferric iron to ferrous iron with production of a corresponding amount of sulphuric acid. By suitably controlling the concentration of the SO_2 in the gas applied to the operation, the proportion of ferric sulphate to sulphuric acid in the final solution may be varied according to the requirements of any particular case. The rapidity of the oxidation is directly proportional to the volume of gas. Maximum oxidation is obtained in neutral solution. Reaction is retarded in the presence of free acid. The fundamental chemistry and physics have proved difficult. The acid limitations are defined, and a number of charts have been prepared comparing acid against time, with varying percentages of ferrous iron. Future work includes design of suitable apparatus and possible application to the leaching of sulphide copper, particularly in waste tailings and dump leaching.

The Nitrate Market

STATISTICS of nitrate of soda for March, according to Aikman (London), Ltd., show that the position at the end of the month was as follows :—Visible supply—Europe and Egypt, 348,500 tons ; United States, 238,000 tons ; Japan and other countries, 18,000 tons ; stocks in Chile, 898,000 tons ; total supply in sight at March 31, 1,502,500 tons, against 2,156,000 tons a year ago, 2,384,000 two years ago, and 1,326,000 in 1914. Deliveries in March totalled 190,000 tons, against 251,000 tons in March, 1922, 146,000 in March, 1921, and 388,000 tons in March, 1914. For the nine months ended with March the deliveries were 686,000 tons, against 601,000 for previous corresponding period in 1921-22, 528,000 in 1920-21, and 1,372,000 in 1913-14.

In their monthly report on the nitrate situation, Henry Bath and Son state that European deliveries during March were estimated at 193,000 tons, compared with 250,000 tons in March, 1922, but the outlook for April was not unpromising. A gradual appreciation was going on in the value of near cargoes, and business on c.i.f. terms took place in nitrate for early arrival at about £12 8s. 9d. up to £12 15s., with £12 10s. to £12 7s. 6d. paid for March-April shipment after business had been done in the latter position down to £11 17s. 6d. In the previous month's report an improvement in prices was attributed to purchases for German consumption. In the present case this factor was not accountable for the firmness, which was due rather to a general demand coupled with the prospect of decidedly moderate supplies. Germany, in fact, did not appear lately to have been buying any more Chilean nitrate, which may be the consequence of a fresh reduction on March 9 in the price of synthetic nitrate of soda from 8,710 marks to 7,460 marks, and for sulphate of ammonia from 7,796.80 marks to 7,460 marks. However, the new prices, at an exchange of 98,000 marks per £1, were still for sulphate of ammonia practically £15 10s., and for nitrate about £12 per ton, and these did not give much advantage to the home-made product. During the past month the Nitrate Producers' Association made further sales f.a.s. Chile of about 190,000 tons, a very noticeable and encouraging feature being further purchases for American account of about 75,000 tons for March-April shipment. Included in the foregoing figure were about 68,000 tons for second-half June shipment, to which extent the Association decided to increase their June commitments after having previously withdrawn from the market for that position. It was understood that early in April the producers would deal with the question of new prices.

Good Sales of Chile Nitrate

AN improvement in Chile's economic situation, due primarily to increased activity in the nitrate industry, is recorded in a dispatch dated March 22 from the Valparaiso branch of the Anglo-South American Bank. Business in the exchange market, it is stated, has again been active, consequent upon the continued satisfactory character of the nitrate sales, which during the last few days have again been much above the average, amounting to nearly 58,000 tons. The actual sales totalled 579,395 metric quintals, as compared with 784,928 and 445,448 metric quintals in the two preceding weeks. Since May last the total sales now amount to 19,569,000. No more sales are being made for shipment in the second half of June at the price of 19s. 1d. per metric quintal, and a meeting of the Nitrate Association will be held in Valparaiso on April 4 for the purpose of authorising the immediate fixing of prices for forward delivery. The proposal for the renewal of the Association for a further five years is also expected to be brought forward, and in view of the very substantial advantages which the industry has reaped from the operations of the Association during the last year or two, it is expected that the proposal will receive general support.

The recent activity in the nitrate industry has had a favourable effect on the Government revenue, the total receipts from Customs duties for January having amounted to $13,074,000 gold of 18d., showing an increase of over $8,000,000 as compared with the corresponding month of last year. Of the total $7,735,000 (gold) was derived from export taxes—practically the whole of it from nitrate shipments—the receipts from import duties being $4,877,000.

From Week to Week

SPAIN AND THE CANARIES are now the United Kingdom's best customers for sulphate of ammonia.

THE COUNCIL OF the British Association for the Advancement of Science is nominating Sir David Bruce as president of the Association at its meeting in Toronto in 1924.

LORD READING has given his assent to the Indian Finance Bill, which contains provision for the doubling of the salt tax. The Bill thus becomes an Act of the Indian Legislature.

DR. W. D. BANCROFT has been elected Editor-in-Chief of the *Journal of Physical Chemistry*, now controlled by an editorial board of English and American physical chemists.

MR. H. W. GARDNER, assistant lecturer in agricultural chemistry at the East Anglian Institute of Agriculture, has been appointed agricultural chemist at the Herts Farm Institute, St. Albans.

IT IS UNDERSTOOD that a United States dyestuffs manufacturer has secured a large order, valued at $5,000,000, for the supply of dyes to an Asiatic country, which is a direct result of the occupation of the Ruhr.

MR. J. E. ROGERS, B.Sc., has been appointed technical works manager at Port Sunlight. Mr. Rogers, who is the son of the Rev. Stanley Rogers, was trained at the Bootle Technical School, and graduated in science at Liverpool University.

THE body of the late Sir James Dewar was cremated on Saturday, March 31, at Golders Green. There was no congregation, no service, and no ceremony of any kind, the cremation being absolutely private in accordance with the expressed wish of the friends.

THE ACADEMY OF MEDICINE of Toronto have given official recognition to Dr. Banting as the discoverer of the insulin treatment of diabetes. As stated in THE CHEMICAL AGE recently a plant for the production of insulin is now in course of installation at the works of the British Drug Houses, Ltd., under license from the Board of Trade.

THE POWER-GAS CORPORATION, LTD., of Stockton-on-Tees, have completed the construction and erection of a water gas plant for Synthetic Ammonia and Nitrates, Ltd., of Billingham. The plant comprises three mechanical generators and auxiliaries with a rated capacity of six million cubic feet of gas per day, and will represent the most modern practice in water gas production on a large scale.

THE PHOTOGRAPHIC DEVELOPER known as " metol " has the disadvantage that it is sometimes irritating to the skin of the operator. It has now been found from research conducted by the British Dyestuffs Corporation that this effect is due to the presence of symmetric dimethyl-paraphenylenediamine as an impurity, and this useful developing agent may now be prepared entirely free from this impurity.

THE TOMB of Tutankh-amen has provided some chemical problems which are being investigated. They include an inquiry into the formation of selective colouring on gold, the chemical nature of the colours on the walls, etc., and the reasons for the varying decay of fabrics, leather, etc. Tanned leather has become brittle and black, while raw hides have become like pitch, having at some period " run " like a viscous liquid.

THE STRIKE of 300 employees of Burgoyne, Burbidge, and Co., manufacturing chemists, East Ham, ceased on Thursday, March 29, and negotiations have proceeded between the company and the National Drug and Chemical Workers' Union on the subject of wage reductions and a settlement has been reached, the workers having accepted the employers' final offer. The problem of the employment of non-union workers has solved itself by all the workers joining the union, which has been recognised by the company.

ACCORDING TO A REPORT from Nanking, a new plant is being erected in the Yangtse Valley to produce cement. This plant, midway between the two greatest markets of China, will have an initial output of four hundred 375 lb. barrels per day. The China Cement Manufacturing Co., the first to produce in this vicinity, has invested about £75,000 in the enterprise. With the completion of this plant, which will begin operations shortly, and of another in Shanghai, China's demands for cement will be met by domestic production to a large extent.

PROFESSOR F. FRANCIS, D.Sc., Pro-Vice-Chancellor, Professor of Chemistry, and Dean of the Faculty of Science, of Bristol University, delivered the annual Long Fox lecture on Tuesday, March 27, his subject being " The Relation between Chemistry and Medicine." In the course of the lecture he said that he did not think he would be going too far in stating that chemistry was rapidly converting medicine into a science. It would be of immense advantage to medicine to have exact knowledge of the chemistry of the body.

A DEPUTATION from the Bengal School of Chemical Technology recently waited on the Minister of Agriculture and Industry in Calcutta and made an application for a grant to aid research and also for free facilities and State patronage for a stall at the forthcoming British Empire Exhibition next year. In reply the Minister stated that though owing to financial stress the Government were not able to offer financial assistance, he would bring the request in connection with the exhibition to the notice of the Exhibition Committee.

A FIRE occurred on Wednesday, March 28, at Typke and Kings, Ltd., Crown Chemical Works, Common-side East, Mitcham. The works are engaged chiefly in manufacturing hypophosphate of lime, soda, potash, and antimony. The fire broke out in one of the drying appartus rooms, which are apart from the main buildings. Three of these rooms were totally destroyed, as well as one large store room. The main building was not damaged, and no one was injured. The loud reports which were heard shortly after the commencement of the outbreak were due to explosions of gas meters.

THE RAVAGES OF THE BOLL-WEEVIL and of the pink bollworm are now so manifest to everybody in the cotton-growing States of America that at last a concerted effort has been begun to destroy the pest. Calcium arsenate is to be the principal weapon, but there is not enough of this in the United States to serve all needs. A group of scientists, with funds furnished by the cotton-growing States, is doing what it can to stimulate production, and at the same time trying to find other effective means for dealing with the weevil. At the moment there is almost no hope that enough calcium arsenate can be produced before next July to deal with the emergency.

AN INQUEST was held on Wednesday, March 28, respecting the death of William Taylor, a chemical worker, at Brunner Mond and Co.'s Lostock works' lime kilns. Previously immune from even minor cases of gassing, Taylor, within ten minutes of leaving the foreman, was found dead on the floor of the limekiln, which was even then entered safely by the assistant foreman. A doctor diagnosed the case as one of carbon monoxide poisoning, the suspected cause being a sudden down draught. The inspector stated that no regulations had been broken, and he would confer with the firm on the subject of preventative measures. A verdict of " accidental death " was returned.

THE FIRST ANNUAL REPORT of the Railway Rates Tribunal was published on Wednesday. The Tribunal has power on application from traders or the railway companies to modify the charges which the companies by the transitory provisions of Section 60 of the 1921 Act are entitled to make until June 30, 1923. Details of eleven applications by traders are given. Certain preliminary questions of principle have been under discussion with the railway companies and proposals as regards minimum distances and charges, mileage gradations and form of schedules, have been received. Public inquiries on these proposals were held on February 27 and 28, and March 1, 2, and 5. The minutes of each day's proceedings were published by the Stationery Office

FROM A TELEGRAM which has been received by the Board of Trade from the British High Commissioner at Coblence, it appears that, in some cases, British traders who desire to secure the delivery of goods from the occupied territory of Germany under the special arrangements made for goods ordered before February 1 are sending applications, accompanied by details of the transactions, to the Restitution Committee at Wiesbaden, with the result that delay in dealing with the applications is caused. It is desired, therefore, to impress on British traders that they should send either direct or through the Board of Trade full particulars of goods purchased from firms in the occupied territory before February 1 to the British High Commissioner, Inter-Allied Rhineland High Commission, Coblence, and not to Wiesbaden.

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Abstracts of Complete Specifications

193,912 and 194,244. Cellulose Acetate Products, Treatment of. British Cellulose and Chemical Manufacturing Co., Ltd., 8, Waterloo Place, London, S.W.1, and W. Bader, of the British Cellulose and Chemical Manufacturing Co., Ltd., Spondon, near Derby. Application date, November 2, 1921.

193,912. The process is for treating cellulose acetate to overcome the small affinity it usually possesses for dyestuffs. The usual treatment with dilute caustic soda of 0·05–0·1 per cent. strength is slow and uncertain if the solution is cold, and is difficult to control if the solution is hot. In the present invention it is possible to use relatively strong solutions of caustic soda (2–15 per cent.) at ordinary temperature to produce a uniform saponification of the surface of the material. It is found that the reaction may be retarded by (1) the application of low temperatures; (2) the addition of alkali metal salts; (3) by coating the threads or the like with soap. The material may be soaked in the solution, and the excess then removed, leaving only sufficient for the desired amount of saponification, or the material may be left in the solution until sufficiently saponified and then washed. In an example, the material is soaked with a cold solution of 5–10 per cent. caustic soda, and then passed between rollers to remove the excess and leave about 8 per cent. of soda in the material. The solution may be at a temperature of 0° to –10° C., or may contain a sodium salt such as the carbonate, chloride, sulphate or acetate, to retard the reaction. The cellulose acetate is then saponified sufficiently to be dyed in the ordinary manner.

194,244. This process is also for treating cellulose acetate to render it more receptive to dyes. The cellulose acetate is subjected to preliminary treatment with a 25 per cent. solution of sodium chloride, and is then subjected to saponification by strong or weak caustic alkali solution. It is found that this preliminary treatment so modifies the surface of the cellulose acetate product that the subsequent saponification affects the surface uniformly. The salt solution may be used repeatedly, and is replenished when necessary. If the salt solution contains a very small quantity (0·5 per cent.) of alkali or alkaline earth hydroxide, the subsequent saponification is facilitated and takes place more rapidly. The saponification is effected at ordinary temperatures, not exceeding 25° C.

193,922. Hydrocarbons of Relatively Low-Boiling Point from Hydrocarbons of Higher Boiling Point, Process of Producing. M. Melamid, 9, Urachstrasse, Freiburg, Baden, Germany. Application date, November 10, 1921. Addition to 171,367, as modified by 171,390, 174,321 and 180,625.

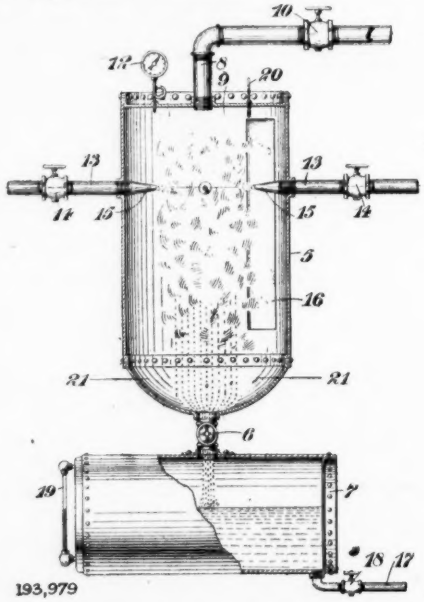
Specifications Nos. 171,367, 174,321 and 180,625 (see The Chemical Age, Vol. VI., pp. 48, 396, Vol. VII., p. 132) describe the treatment of tar oils, mineral oils, and other hydrocarbons by heating them in the presence of tin, or other metals and alloys and hydrogen, to convert them into low-boiling products. In the present invention it is found that the conversion takes place without the employment of pressure if the temperature is above 600° C., preferably 800° C. If the temperature is raised to 900° C., the low-boiling products are obtained without the use of hydrogen.

193,934. Treatment of Mineral and other Oils for the Production of Volatile Liquids Adapted for Use as Fuel. F. de M. Accioly, 1, Rua Lopes Farraz, Sao Christavao, Rio de Janeiro, Brazil. Application date, November 26, 1921.

Crude mineral oil such as shale oil, or vegetable oil or animal oil, is mixed with naphtha, potassium carbonate, sulphuric acid, benzoic acid, naphthalene, and a soap product, and the mixture is distilled. To obtain the soap product a mixture of hydrochloric acid, manganese dioxide, and water, is distilled until the distillate is 80–95 per cent. of the original mixture, and then treated with caustic soda, potassium carbonate, chloride of lime, and quicklime. This mixture is then heated with soap and common salt, and the soap product is then separated after standing. The oil distillate obtained from vegetable or animal oil amounts to 40 to 50 per cent. of the original oil, and from 50 to 60 per cent. when mineral oil is treated. The distillate is then treated with the same caustic mixture to which the soap was added, together with caustic soda. Concentrated sulphuric acid is then added, and the aqueous layer allowed to settle out. A mixture of the soap product, sodium hypochlorite and benzoic acid is then added, and the mixture distilled again. It is found that 10–40 per cent. of low-boiling oil may be obtained by this process from mineral oils.

193,947. Drying and Treatment of Finely Divided Carbonaceous Matter. W. Broadbridge, 62, London Wall, London, E.C.2; E. Edser, 3, Hillyfields Crescent, Brockley, London, S.E.4; W. W. Stenning, and Minerals Separation, Ltd., 62, London Wall, London, E.C.2. Application date, November 29, 1921.

The process is for treating finely divided coal by the froth-flotation process and then treating the concentrate to free it from water which is present in considerable proportion. It is found that oils, tars, and other hydrocarbons or carbonaceous liquids have the property of coating the coal particles, and causing them to flocculate together. The finely divided coal obtained by froth flotation is suspended in sufficient water to make a mobile pulp, and is then subjected to vigorous agitation with about 3–10 per cent. of a flocculating agent. This quantity is insufficient to fill the spaces between the particles, but is sufficient to coat them and flocculate them in water. The water is then removed by draining or by filtration and the residue is coked in a retort. The tarry residue obtained from the distillate may be used as the flocculating agent. Anthracene oil or coal tar oil may also be used as flocculating agents. The flocculated coal may be compressed into briquettes to facilitate handling, but these briquettes are not durable and are easily crumbled. Coal treated in this manner contains only about 3–5 per cent. of moisture. Alternatively pulverised waste coal may be mixed with its own weight of water and with 4·7 per cent. of coal tar, 0·075 per cent. of cresol, and 0·075 per cent. of paraffin oil. The mixture is agitated and aerated, and the flocculated coal is removed as a froth, which is then subjected to pressure. In one example the resulting cake contained only 5·76 per cent. of ash, and 3·87 per cent. of moisture.



193,979

193,979. Desulphurising Oil. N. H. Freeman, 5, Hythe Road, Willesden, London, N.W.10. Application date, December 5, 1921.

The process is for extracting the sulphur from mineral oil or shale oil without destruction of the oil by overheating.

The oil is atomised under a pressure of 50 lb. per square inch in a desulphurising medium which may be a gas, a mixture of gases, or a vapour, or a liquid, or solid. The desulphurising medium may be ammonia gas with or without hydrogen, or aqueous ammonia, or a finely powdered oxide. Free hydrogen may also be present to hydrogenate the atomised oil. The desulphurising is effected at atmospheric temperature and with a desulphurising medium at atmospheric pressure. The reaction vessel 5 is provided with a number of horizontal nozzles 15, some of which are supplied with the oil, and others with water. Hydrogen and ammonia may be supplied through an inlet pipe 8. Temperature and pressure indicators 20, 12, are provided at the top, and an outlet 6 is provided at the bottom leading to a receiver 7. The vessel 5 is first filled with hydrogen and ammonia, and the oil and water atomised into it. The liquid is discharged so that the level in the vessel 5 is maintained at about 21° C., and the sulphur is separated from the liquid collected from the tank 7. If the desulphurising medium is a liquid, the oil is atomised into it below the surface, and the desulphurised oil rises to the top. The desulphurising medium should be one which does not emulsify the oil.

194,026. Fixation of Nitrogen, Process for. Woodall, Duckham and Jones (1920), Ltd., 52, Grosvenor Gardens, London, S.W.1; Oldbury S.C. Syndicate, Ltd., 49, Queen Victoria Street, E.C.4; and Sir A. M. Duckham, 52, Grosvenor Gardens, London, S.W.1. Application date, December 20, 1921.

The process is for the fixation of nitrogen by the means of a heated mixture of barium carbonate or oxide, and carbon. When the reaction is carried out in an externally heated vertical retort the walls of the retort are liable to be attacked by the material at the high temperature employed, and the passage of the material through the retort is restricted by adhesion to the walls. If a horizontal retort is used, the highly heated material is not easily withdrawn. In the present invention the material is spread in a thin layer on the bottom of a muffle furnace such as described in Specification No. 176,834 (see The Chemical Age, Vol. VI., p. 524), and heat is applied to the roof only. The bottom of the muffle is formed as a conveyor so that the material is heated and cooled gradually, and is not in contact with the heated walls.

194,143. Mixtures for Use in Dyeing. British Dyestuffs Corporation, Ltd., Imperial House, Kingsway, London, W.C.2, and W. E. Sanderson, Turnbridge Works, Huddersfield. Application date, March 11, 1922.

The affinity of wool or other animal fibre for acid dyes at temperatures of 30° to 100° C. in a soap bath or similar alkaline bath may be greatly increased by the addition of an ammonium salt such as the oxalate, sulphate or chloride, together with common salt or Glauber salt. The dyestuffs so treated include those which have also substantive affinity for cotton. The presence of the ammonium salt does not interfere with the fixation of substantive dyes on cotton, so that a mixture of wool dye and substantive cotton dye together with an ammonium salt and soap can be used. By this invention a larger range of colours may be obtained, since a number of acid dyestuffs, including substantive cotton dyestuffs, may be used for dyeing wool in the presence of the ammonium salt and common salt or sodium sulphate, although these would have no affinity for wool in a soap bath alone. This mixture is suitable for the preparation of packet dyestuffs for domestic use. In an example, a mixture of acid green G 1 part, ammonium sulphate 2 parts, soap flakes 20 parts, and salt 20 parts, gives a green colour on wool and silk, leaving cotton unstained. Other examples of dyes giving uniform shades on wool, silk and cotton are given.

194,165. Red Basic Dyestuffs, Production of. A. G. Green and E. B. Adams, Crumpsall Vale Chemical Works, Blackley, Manchester, and British Dyestuffs Corporation, Ltd., Imperial House, Kingsway, London. Application date, March 29, 1922.

Dyestuffs of the acridinium class are subjected to bromination by treating with one or two molecular proportions of bromine in cold aqueous or alcoholic solution, yielding dyestuffs having a redder shade than the original dyestuff. These dyestuffs may be treated with acids or acid salts yielding products which produce bluer shades of red than the original bromination products in dyeing and printing. The same products are obtained by bromination of the acridinium compounds in the presence of a mineral acid. The transformation is probably due to a molecular rearrangement involving a transposition from an ortho-quinonoid to a para-quinonoid type. The transformation by means of acids appears to be confined to acridinium compounds, and does not occur with the halogenated acridines. In an example, the methyl sulphate of tetramethyl-diamino-methyl-acridinium is dissolved in alcohol, and one molecular proportion of bromine is added, yielding a reddish precipitate which dyes tannin-mordanted cotton scarlet. The product may be treated with concentrated hydrochloric acid until the colour changes to bluish-red, and the solution is then heated to boiling and the dyestuff precipitated by zinc chloride and common salt. Similar products may be obtained from tetra-methyl-diamido-phenyl-methyl-acridinium methyl sulphate.

194,208. Fertilisers. Soc. Anon. Produits Chimiques et Engrais L. Bernard, Mesvin, Ciply, Belgium. International Convention date, April 27, 1922.

The object is to obtain a fertiliser containing phosphorus and potassium, in which the greater part of these ingredients is in an assimilable form. Natural phosphate or enriched phosphate is finely ground and mixed with ground blast furnace slag or felspar and alkali waste. The latter may be salt residue from sugar mills, distilleries or the like, or grease obtained in the treatment of wool. These substances are intimately mixed, and then roasted in a rotary furnace at 900°–1,300° C., and then ground again. In an example, the mixture consists of tricalcium phosphate 70 parts, slag 23 parts, and salt waste or wool grease 7 parts.

Note.—Abstracts of the following specifications which are now accepted, appeared in The Chemical Age when they became open to inspection under the International Convention:—171,094 (F. Pollak), relating to condensation products from formaldehyde and urea, thiourea or other derivatives, see Vol. V., p. 846; 172,966 (L. Weil and Chemische Fabrik in Billwarder vorm. Hell und Sthamer Akt.-Ges.), relating to the production of high-percentage pure anthracene, see Vol. VI., p. 210; 173,321 (M. Melamid), relating to production of hydrocarbons of relatively low-boiling point, see Vol. VI., p. 396; 180,988 (A. A. L. J. Damiens, M. C. J. E. de Loisy, and O. J. G. Piette), relating to the recovery of ethylene contained in the industrial gases, for the manufacture of alcohol or ether, see Vol. VII., p. 180; 188,652 (Nitrogen Corporation), relating to drying gases, see Vol. VIII., p. 101.

International Specifications not yet Accepted

192,376. Carbazole Derivatives. National Aniline and Chemical Co., Inc., 40, Rector Street, Manhattan, New York. Assignees of R. W. Hess, Buffalo, N.Y., U.S.A., and J. C. Siemann, 283, 11th Street, New York. International Convention date, January 25, 1922.

Carbazole is converted directly into its alkyl, aryl, and aralkyl derivatives without the intermediate formation of potassium carbazole, by treating with the alkylating or other agent and a dehydrating agent such as solid caustic alkali. A solvent, such as solvent naphtha, chlorbenzene, toluene or steam-distilled kerosene may also be present. In an example, toluene, carbazole, granular caustic soda and diethyl sulphate are heated in an iron reflux apparatus, by means of a steam jacket, to 85° C., and finally to boiling point. The product is then steam-distilled to remove toluene, and the ethyl-carbazole washed with water. It may be recrystallised from ethyl alcohol.

192,392. Acetone. Elektrizitätswerk Lonza, Basle, Switzerland. International Convention date, January 26, 1922.

A mixture of acetylene and steam is passed over a catalyst heated to 350°–450° C. to produce acetone. The catalyst consists of thorium hydroxide, oxide or carbonate, or a double alt of thorium and an alkali or alkaline earth, such as potassiums thorium carbonate, mounted on a carrier such as burnt clay or pumice. A mixture of air and steam may be passed over the heated catalyst to regenerate it.

192,393. TREATING LIQUIDS WITH GASES. D. G. Zalocostas, 164, Pitt Street, Sydney, Australia. Assignee of Sheet Metal Workers, Ltd., Young Street, Waterloo, near Sydney, Australia. International Convention date, January 25, 1922.

The apparatus is particularly suitable for absorbing sulphuric acid gas in acid liquor. A tank 10 is provided with a number of superposed horizontal plates 17, 20, arranged in pairs, and supported one on the other by legs 23. The lower plate of

FIG. 1.

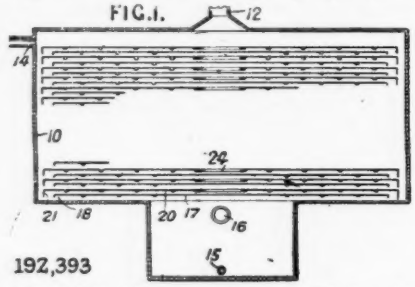
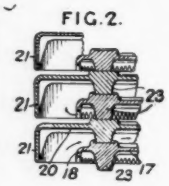


FIG. 2.

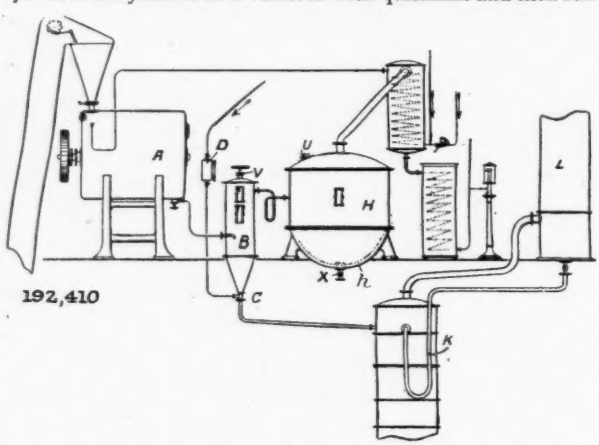


192,393

each pair is of smaller diameter and the edge 18 is serrated and is at the same level as the edge 21 of the upper plate. The liquor is supplied through the inlet 15 and the gas through the inlet 16. The gas is distributed through the liquid as it passes under the serrated edges and through the down-turned nipples which are provided in each plate. The concentrated liquor is drawn off through the outlet 14 and gas through the outlet 12. A valve may be provided which is operated by the pressure of the liquor when saturated, so as to admit water to the tank and displace the liquor through a heat exchanger to absorb the heat of solution of the gas.

192,410. ABSOLUTE ALCOHOL. E. Barbet et Fils et Cie., 5, Rue de l'Echelle, Paris. International Convention date, January 26, 1922. Addition to 189,136.

Specification 189,136 (see THE CHEMICAL AGE, Vol. VIII., p. 103) describes an apparatus for the production of absolute alcohol, using two stills working alternately to permit of scaling. Alcohol of 96° Gay-lussac and at a temperature of 70° C. is dehyrdated in a vessel *A* with quicklime and then run



192,410

into a settling vessel *B*. The alcohol flows into a steam-jacketed still *H* to be distilled, and the lime is removed from the bottom of the vessel *B* by a valve *C*. Water is added from a measuring device *D*, and the mixture passes to a continuous rectifier *KL*. When the still *H* requires scaling, the supply of alcohol from the vessel *B* is stopped while this operation is effected.

192,415. BARIUM HYDRATE. J. Michael and Co., 2, Mittelstrasse, Berlin. International Convention date, January 27, 1922.

Barium sulphide is dissolved in hot water and hydrated crystals obtained by cooling the solution. The crystals are then heated to 75° C. until they become yellow, dissolved in hot water and barium hydrate then crystallised out, leaving the sulphydrate in solution.

LATEST NOTIFICATIONS.

195,048. Aluminium alloys. Aluminium Co. of America. March 18, 1922.

195,055. Treating liquids to remove or recover substances therefrom. Silica Gel Corporation. March 16, 1922.

195,061. Process for removing hydrogen sulphide from gases. T. P. L. Petit. March 16, 1922.

195,064. Manufacture and production of powders of alloys of magnesium and aluminium. J. Sejournet. March 16, 1922.

195,077. Process for the manufacture of ferric hydroxide. Waterloo Chemical Works, Ltd. March 15, 1922.

195,084. Method of treating leucite or other sodium-potassium silicates, for recovering potassium, sodium, and aluminium compounds. F. Jourdan. March 16, 1922.

195,089. Manufacture of colloidal solutions of ferric oxide. Aktieselskabet Hydropeat. March 18, 1922.

Specifications Accepted, with Date of Application

172,962. Treating liquids with decolorising, purifying and filtering agents and separating undissolved substances from liquids, Process and apparatus for. Naamlooze Vennootschap Algemeene Norit Maatschappij. December 13, 1920. Addition to 163,505.

174,086. Hydrocarbon oils, coal tar and the like, Process and apparatus for cracking. Gulf Refining Co. January 15, 1921.

174,336. Materials having an oil-producing content, Apparatus for distilling. Trent Process Corporation. January 20, 1921.

181,677. Silicates, Method of and apparatus for treating with acids—in order to obtain solutions of salts free from silica. G. A. Blanc. June 14, 1921.

183,430. Agglomerating fine materials, Process of. Trent Process Corporation. July 20, 1921.

184,144. Coking and carbonising processes, more particularly low-temperature carbonisation, and apparatus therefor. H. Koppers. August 1, 1921.

188,338. Iron-free chromium compounds, Preparation of. Kinzlberger and Co. November 4, 1921.

191,357. Cellulose from wood and similar substances containing cellulose, Process for obtaining and cleaning. E. Schmidt. January 4, 1922.

194,740. Synthetic production of ammonia. L. Casale. September 19, 1921.

194,804. New fat and oil splitting reagents, Manufacture of—and their application to a process for splitting fats and oils into glycerine and fatty acids. A. Rayner and Price's Patent Candle Co., Ltd. December 20, 1921.

194,815. Tanning, Process of—and manufacture of agents therefor. W. Moeller. December 21, 1921.

194,821. Roasting-furnaces. A. V. Leggo. December 23, 1921.

194,840. Cellulose acetates, Dyeing of. R. Clavel. January 5, 1922.

194,948. Clarification of sugar and other juices, solutions, or the like, Apparatus for use in. Duncan Stewart and Co., Ltd. (*W. Mauss.*) April 3, 1922.

195,026. Separating or isolating organic gases or vapours of organic products, Process for. Farbenfabriken vorm. F. Bayer and Co., and A. Engelhardt. December 16, 1921.

Applications for Patents

Caracristi, V. E. Distillation apparatus. 7,997. March 20.

Clayton, W. Alkali silicates. 7,797. March 19.

Deschamps, J. J. Facilitating physical or chemical reactions in piled bodies. 7,828. March 19. (France, March 21, 1922.)

Farbenfabriken vorm, F. Bayer and Co. Manufacture of azo-dyes. 8,120. March 21.

May and Baker, Ltd., and Newbery, G. Manufacture of derivatives of 3 : 3¹-diamo-4 : 4¹-dihydroxyarseno-benzene, etc. 8,354. March 23.

Schmidt, F. Manufacture of articles from scrap of cellulose derivatives. 8,244. March 22. (Germany, October 13, 1922.)

Patents Court Cases

APPLICATIONS have been made under Rule 7 of the Patents (Treaty of Peace) Rules, 1920, for the grant of licences to Messrs. Barrow, Hepburn and Gale, Ltd., 47, Weston Street, Bermondsey, London, S.E.1, in respect of the following patents: 4648/1911 (E. E. Naef) relating to new compounds obtained by the action of formaldehyde on organic bodies in concentrated sulphuric acid; 8511/1912, 8512/1912, 24216/1912, 24982/1912 (J. Y. Johnson—Badische Anilin und Soda Fabrik) relating to tanning and the production of new tanning agents.

Applications have been made under Section 24 of the Patents and Designs Acts, 1907 and 1919, for the following patents to be indorsed "Licences of Right": 147,030 (E. H. Westling) relating to a process for the production of manganese dioxide; 156,752 (G. Leysieffer) relating to a process for the production of plastic bodies from cellulose ethers.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.

London, April 4, 1923.

THERE is very little change in the position to report at the time of writing, and business is still under the influence of the holidays. Prices generally are without change.

Export inquiry is extremely brisk, and some good business has been transacted.

General Chemicals

ACETONE is without change and is exceedingly scarce on the spot.

ACID ACETIC.—Price is well maintained and the material is in light supply.

ACID CITRIC is firmer with a moderate demand.

ACID FORMIC maintains its advance, and supplies are becoming more difficult to obtain.

ACID LACTIC is firm and in small request.

ACID OXALIC is quiet, but without change in value.

ACID TARTARIC has firmed up again and is in good demand.

ARSENIC is as firm as ever, and a substantial business has been looked for.

BARIUM CHLORIDE is in moderate request, without change in value.

FORMALDEHYDE has been only in quiet demand, but the price is extremely firm.

LEAD ACETATE is scarce and firm.

METHYL ALCOHOL is almost unobtainable on the spot, and quotations are purely nominal.

POTASSIUM CARBONATE is unchanged.

POTASSIUM CAUSTIC is in slightly better demand, on export account more especially.

POTASSIUM PERMANGANATE maintains its advance and is in good request.

POTASSIUM PRUSSIATE has been in better request, and the undertone is firm.

SODIUM ACETATE is scarce and firm.

SODIUM BICHROMATE is unchanged.

SODIUM HYPOSULPHITE is in very good request.

SODIUM NITRITE is without change in value and in fair request.

SODIUM PRUSSIATE is again in demand on export account, and the price is firmer.

SODIUM SULPHIDE.—There is more inquiry than has been the case for some time, and the price is now firmer.

ZINC OXIDE is unchanged.

ZINC SULPHATE is in good request, without change in value.

Pharmaceutical Chemicals

Owing to the Easter holidays the markets have been practically closed, and there are consequently no important price movements to record.

The general tendency is extremely firm, barbitone, hydroquinone and phenacetin being quoted higher by some Continental makers.

Coal Tar Intermediates

There is, of course, only a short week on which to report, but interest appears to be fairly well maintained.

ALPHA NAPHTHOL continues firm, with stocks short.

ALPHA NAPHTHYLAMINE is steady, with fair inquiry about.

ANILINE OIL continues to pass regularly into consumption.

BENZIDINE BASE is unchanged.

BETA NAPHTHOL is without special feature.

DIMETHYLANILINE is very firm, and has been a fair home business.

"H" ACID is steady.

NITRO BENZOL.—Recent values are maintained.

PHTHALIC ANHYDRIDE is in demand, both for home and for export.

RESORCIN.—Some home business is reported.

Coal Tar Products

All coal tar products are now in fairly active demand, and prices are well maintained.

90% BENZOL shows a continued improvement, and is worth about 1s. 8d. to 1s. 9d. per gallon on rails.

PURE BENZOL is also fairly steady at about 2s. 1d. per gallon on rails in the north and 2s. 4d. to 2s. 5d. per gallon in the south.

CREOSOTE OIL maintains its firm tone, and is worth about 9d. per gallon in the midlands and north, and 9½d. to 9¾d. per gallon in the south.

CRESYLIC ACID shows signs of further improvement, the pale quality 97/99% being worth about 2s. 1d. per gallon on rails, while the dark quality 95/97% is worth about 1s. 10d. per gallon.

SOLVENT NAPHTHA shows no improvement from last week, and is worth about 1s. 4d. per gallon on rails.

HEAVY NAPHTHA is also in very poor demand, and is worth about 1s. 5d. per gallon on rails.

NAPHTHALENES are in strong demand, and supplies for near deliveries are almost unobtainable. The lower melting points are worth from £8 to £9 per ton, while the hot pressed quality is quoted at £12 10s. per ton.

PITCH remains firm owing to the continued demand from abroad. There is no alteration in the prices.

Sulphate of Ammonia

The demand remains satisfactory both for home trade and for export.

[*Current Market Prices on following pages.*]

Chas. Page & Co's New Offices

CHAS. PAGE AND CO., LTD., have issued from 37–39, King William Street, London, E.C.4, a circular in which they state:

"We have pleasure in informing you we have now found offices at the above address in which we can accommodate all our departments. Not only will this enable us to carry on our business with greater efficiency, but with much more convenience to our friends. We hope, therefore, that the pleasant business relations that have existed between us in the past will be considerably increased in the future to our mutual advantage. As we now deal in practically every chemical that is produced, we confidently feel you will benefit by informing us of your requirements. Kindly note change of address as from April 3, 1923."

Russia's Chemical Industries

IT is stated in the *European Commercial* that the Supreme Economic Council of Russia has worked out an industrial concentration plan for this year. In the South two metallurgical factories will be put into operation, presumably the Jusovski and Petrovski works, while five other factories will likewise be put into condition for the execution of special orders. On the other hand, 15 factories must be closed altogether. In regard to the chemical industries, the programme only provides for increased activity in the production of dyes, rubber, and pharmaceutical articles. Of 226 concerns working in the chemical line, 127 are already at a standstill; it is now proposed to close two more. No limitation is suggested for the Petrograd paper industry, while 231 of the 342 leather and footwear factories will be sacrificed, but 102 spirit distilleries and 115 oil refineries will continue to work. All the agricultural branches of industry will be limited to 117 factories between them, and 320 or 330 timber works will be kept running out of a total of 1,240.

Current Market Prices

General Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	1	7	to	0	1	9
Acetone oil	ton	90	0	0	to	95	0	0
Acetone, pure	ton	130	0	0	to	135	0	0
Acid, Acetic, glacial, 99–100%	ton	69	0	0	to	70	0	0
Acetic, 80% pure	ton	48	0	0	to	50	0	0
Acetic, 40% pure	ton	25	0	0	to	26	0	0
Arsenic, liquid, 2000 s.g.	ton	100	0	0	to	105	0	0
Boric, cryst.	ton	55	0	0	to	60	0	0
Carbolic, cryst. 39–40%	lb.	0	1	7	to	0	1	8
Citric	lb.	0	1	9	to	0	1	10
Formic, 80%	ton	52	10	0	to	53	0	0
Hydrofluoric	lb.	0	0	7½	to	0	0	8½
Lactic, 50 vol.	ton	41	0	0	to	43	0	0
Lactic, 60 vol.	ton	43	0	0	to	44	0	0
Nitric, 80 Tw.	ton	27	0	0	to	28	0	0
Oxalic	lb.	0	0	6¾	to	0	0	7
Phosphoric, 1.5	ton	40	0	0	to	42	0	0
Pyrogallic, cryst.	lb.	0	5	9	to	0	6	0
Salicylic, Technical	lb.	0	1	9	to	0	2	0
Sulphuric, 92–93%	ton	6	0	0	to	7	0	0
Tannic, commercial	lb.	0	2	3	to	0	2	9
Tartaric	lb.	0	1	4	to	0	1	4½
Alum, lump	ton	12	10	0	to	13	0	0
Alum, chrome	ton	28	0	0	to	29	0	0
Alumino ferric	ton	9	0	0	to	9	5	0
Aluminium, sulphate, 14–15%	ton	8	10	0	to	9	0	0
Aluminium, sulphate, 17–18%	ton	10	10	0	to	11	0	0
Ammonia, anhydrous	lb.	0	1	6	to	0	1	8
Ammonia, .880	ton	32	0	0	to	34	0	0
Ammonia, .920	ton	22	0	0	to	24	0	0
Ammonia, carbonate	lb.	0	0	4	to	0	0	4½
Ammonia, chloride	ton	50	0	0	to	55	0	0
Ammonia, muriate (galvanisers)	ton	35	0	0	to	37	10	0
Ammonia, nitrate (pure)	ton	35	0	0	to	40	0	0
Ammonia, phosphate	ton	68	0	0	to	70	0	0
Ammonia, sulphocyanide, com'l, 90%	lb.	0	1	1	to	0	1	3
Amyl acetate	ton	175	0	0	to	185	0	0
Arsenic, white, powdered	ton	70	0	0	to	75	0	0
Barium, carbonate, Witherite	ton	5	0	0	to	6	0	0
Barium carbonate, Precip.	ton	15	0	0	to	16	0	0
Barium, Chlorate	ton	65	0	0	to	70	0	0
Barium Chloride	ton	17	0	0	to	17	10	0
Nitrate	ton	33	0	0	to	35	0	0
Sulphate, blanc fixe, dry	ton	20	10	0	to	21	0	0
Sulphate, blanc fixe, pulp	ton	10	5	0	to	10	10	0
Sulphocyanide, 95%	lb.	0	1	0	to	0	1	1
Bleaching powder, 35–37%	ton	10	10	0	to	11	0	0
Borax crystals	ton	28	0	0	to	32	0	0
Calcium acetate, Brown	ton	11	10	0	to	12	0	0
" " Grey	ton	19	15	0	to	20	0	0
Calcium Carbide	ton	16	0	0	to	17	0	0
Chloride	ton	6	0	0	to	7	0	0
Carbon bisulphide	ton	35	0	0	to	40	0	0
Casein technical	ton	105	0	0	to	110	0	0
Cerium oxalate	lb.	0	3	0	to	0	3	6
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	6	0	to	0	6	6
Oxide, black	lb	0	9	6	to	0	10	0
Copper chloride	lb.	0	1	2	to	0	1	3
Sulphate	ton	27	0	0	to	28	0	0
Cream Tartar, 98–100%	ton	90	0	0	to	92	10	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde, 40% vol.	ton	90	0	0	to	92	10	0
Formusol (Rongalite)	lb.	0	2	2	to	0	2	3
Glauber salts, commercial	ton	5	0	0	to	5	10	0
Glycerin, crude	ton	65	0	0	to	67	10	0
Hydrogen peroxide, 12 vols.	gal.	0	2	2	to	0	2	3
Iron perchloride	ton	30	0	0	to	32	0	0
Iron sulphate (Copperas)	ton	3	10	0	to	4	0	0
Lead acetate, white	ton	42	0	0	to	44	0	0
Carbonate (White Lead)	ton	45	0	0	to	48	0	0
Nitrate	ton	44	10	0	to	45	0	0
Litharge	ton	35	10	0	to	36	0	0
Lithopone, 30%	ton	22	10	0	to	23	0	0
Magnesium chloride	ton	5	10	0	to	6	0	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	6	10	0	to	7	0	0
Sulphate (Druggists')	ton	10	0	0	to	11	0	0
Manganese Borate, commercial	ton	65	0	0	to	75	0	0
Sulphate	ton	58	0	0	to	60	0	0
Methyl acetone	ton	71	0	0	to	75	0	0
Alcohol, 1% acetone	ton	105	0	0	to	110	0	0
Nickel sulphate, single salt	ton	41	0	0	to	42	0	0
Ammonium sulphate, double salt	ton	41	0	0	to	42	0	0
Potash, Caustic	ton	33	0	0	to	34	0	0
Potassium bichromate	lb.	0	0	5¾	to	0	0	6
Carbonate, 90%	ton	31	0	0	to	32	0	0
Chloride, 80%	ton	9	10	0	to	10	10	0
Chlorate	lb.	0	0	4½	to	0	0	4½
Metabisulphite, 50–52%	ton	84	0	0	to	90	0	0
Nitrate, refined	ton	43	0	0	to	45	0	0
Permanganate	lb.	0	0	10	to	0	0	10½
Prussiate, red	lb.	0	4	3	to	0	4	6
Prussiate, yellow	lb	0	1	5½	to	0	1	6
Sulphate, 90%	ton	12	10	0	to	13	10	0
Salammoniac, firsts	cwt.	3	3	0	to		—	
Seconds	cwt.	3	0	0	to		—	
Sodium acetate	ton	24	15	0	to	25	0	0
Arsenate, 45%	ton	48	0	0	to	50	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	4½	to	0	0	4¾
Bisulphite 60–62%	ton	21	0	0	to	23	0	0
Chlorate	lb.	0	0	3½	to	0	0	3¾
Caustic, 70%	ton	19	10	0	to	20	0	0
Caustic, 76%	ton	20	10	0	to	21	0	0
Hydrosulphite, powder	lb.	0	1	6	to	0	1	7
Hyposulphite, commercial	ton	10	10	0	to	11	0	0
Nitrite, 96–98%	ton	28	0	0	to	29	0	0
Phosphate, crystal	ton	16	0	0	to	16	10	0
Perborate	lb.	0	0	11	to	0	0	11½
Prussiate	lb.	0	0	9½	to	0	0	9¾
Sulphide, crystals	ton	10	10	0	to	11	0	0
Sulphide, solid, 60–62%	ton	16	10	0	to	17	10	0
Sulphite, cryst.	ton	12	10	0	to	13	0	0
Strontium carbonate	ton	55	0	0	to	60	0	0
Strontium Nitrate	ton	40	0	0	to	42	0	0
Strontium Sulphate, white	ton	6	10	0	to	7	10	0
Sulphur chloride	ton	25	0	0	to	27	10	0
Sulphur, Flowers	ton	11	10	0	to	12	10	0
Roll	ton	11	0	0	to	12	0	0
Tartar emetic	lb.	0	1	3	to	0	1	4
Tin perchloride, 33%	lb.	0	1	2	to	0	1	4
Perchloride, solid	lb.	0	1	5	to	0	1	7
Protochloride (tin crystals)	lb.	0	1	4	to	0	1	5
Zinc chloride 102° Tw.	ton	21	0	0	to	22	10	0
Chloride, solid, 96–98%	ton	25	0	0	to	30	0	0
Oxide, 99%	ton	40	0	0	to	42	0	0
Dust, 90%	ton	45	0	0	to	47	10	0
Sulphate	ton	16	10	0	to	17	10	0

Pharmaceutical Chemicals

Acetyl salicylic acid	lb.	0	3	2	to	0	3	6
Acetanilid	lb.	0	1	6	to	0	1	9
Acid, Gallic, pure	lb.	0	3	0	to	0	3	3
Lactic, 1.21	lb.	0	2	9	to	0	3	0
Salicylic, B.P.	lb.	0	2	2	to	0	2	6
Tannic, leviss	lb.	0	3	4	to	0	3	6
Amidol	lb.	0	8	6	to	0	8	9
Amidopyrin	lb.	0	13	0	to	0	13	6
Ammon ichthosulphonate	lb.	0	2	0	to	0	2	3
Barbitone	lb.	0	17	6	to	0	18	0
Beta naphthol resublimed	lb.	0	1	9	to	0	2	0
Bromide of ammonia	lb.	0	0	7½	to	0	0	8
Potash	lb.	0	0	7	to	0	0	7½
Soda	lb.	0	0	7½	to	0	0	8½
Caffeine, pure	lb.	0	12	0	to	0	12	3
Calcium glycerophosphate	lb.	0	5	9	to	0	6	0
Calcium lactate	lb.	0	2	0	to	0	2	3
Calomel	lb.	0	4	9	to	0	5	0
Chloral hydrate	lb.	0	4	0	to	0	4	3
Cocaine alkaloid	oz.	0	18	0	to	0	18	6
Cocaine hydrochloride	oz.	0	14	9	to	0	15	0
Corrosive sublimate	lb.	0	4	3	to	0	4	6
Eucalyptus oil, B.P. (70–75% eucalyptol)	lb.	0	1	6	to	0	1	6½
B.P. (75–80% eucalyptol)	lb.	0	1	7	to	0	1	7½
Guaiacol carbonate	lb.	0	8	3	to	0	8	6
Liquid	lb.	0	9	0	to	0	9	6
Pure crystals	lb.	0	10	0	to	0	10	6
Hexamine	lb.	0	4	3	to	0	4	6
Hydroquinone	lb.	0	3	6	to	0	3	9
Lanoline anhydrous	lb.	0	0	7	to	0	0	7½
Lecithin ex ovo	lb.	0	18	6	to	1	0	0
Lithia carbonate	lb.	0	9	6	to	0	10	0
Methyl salicylate	lb.	0	2	6	to	0	2	9
Metol	lb.	0	9	6	to	0	10	0
Milk sugar	cwt.	4	15	0	to	5	0	0
Paraldehyde	lb.	0	1	6	to	0	1	9
Phenacetin	lb.	0	5	9	to	0	6	3
Phenazone	lb.	0	7	3	to	0	7	6
Phenolphthalein	lb.	0	5	0	to	0	5	3
Potassium sulpho guaiacolate	lb.	0	5	0	to	0	5	3
Quinine sulphate, B.P.	oz.	0	2	3			—	

	Per	£	s.	d.		£	s.	d.
Resorcine, medicinal	lb.	0	5	3	to	0	5	6
Salicylate of soda powder	lb.	0	2	6	to	0	2	9
Crystals	lb.	0	2	9	to	0	3	0
Salol	lb.	0	2	6	to	0	2	9
Soda Benzoate	lb.	0	2	3	to	0	2	6
Sulphonal	lb.	0	13	6	to	0	14	0
Terpene hydrate	lb.	0	1	9	to	0	2	0
Theobromine, pure	lb.	0	12	0	to	0	12	6
,, soda salicylate	lb.	0	7	9	to	0	8	3
Vanillin	lb.	1	3	6	to	1	4	6

Coal Tar Intermediates, &c.

Alphanaphthol, crude	lb.	0	2	0	to	0	2	3
Alphanaphthol, refined	lb.	0	2	6	to	0	2	9
Alphanaphthylamine	lb.	0	1	6	to	0	1	7
Aniline oil, drums extra	lb.	0	0	9½	to	0	0	10
Aniline salts	lb.	0	0	9½	to	0	0	10
Anthracene, 40–50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	3	0	to	0	3	3
Benzidine, base	lb.	0	5	0	to	0	5	3
Benzidine, sulphate	lb.	0	3	9	to	0	4	0
Benzoic acid	lb.	0	2	0	to	0	2	3
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol	lb.	0	1	1	to	0	1	2
Betanaphthylamine, technical	lb.	0	4	0	to	0	4	3
Croceine Acid, 100% basis	lb.	0	3	3	to	0	3	6
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	4	6	to	0	4	9
Dinitrobenzol	lb.	0	1	1	to	0	1	2
Dinitrochlorbenzol	lb.	0	0	11	to	0	1	0
Dinitronaphthalene	lb.	0	1	4	to	0	1	5
Dinitrotoluol	lb.	0	1	4	to	0	1	5
Dinitrophenol	lb.	0	1	7	to	0	1	9
Dimethylaniline	lb.	0	3	0	to	0	3	3
Diphenylamine	lb.	0	3	9	to	0	4	0
H-Acid	lb.	0	5	0	to	0	5	3
Metaphenylenediamine	lb.	0	4	0	to	0	4	3
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	5	9	to	0	6	0
Metatoluylenediamine	lb.	0	4	0	to	0	4	3
Monosulphonic Acid (2.7)	lb.	0	5	6	to	0	6	0
Naphthionic acid, crude	lb.	0	2	3	to	0	2	6
Naphthionate of Soda	lb.	0	2	6	to	0	2	9
Naphthylamin-di-sulphonic-acid	lb	0	4	0	to	0	4	3
Neville Winther Acid	lb.	0	7	3	to	0	7	9
Nitrobenzol	lb.	0	0	8	to	0	0	8
Nitronaphthalene	lb.	0	1	0	to	0	1	1
Nitrotoluol	lb.	0	0	8	to	0	0	9
Orthoamidophenol, base	lb.	0	12	0	to	0	12	6
Orthodichlorbenzol	lb.	0	1	0	to	0	1	1
Orthotoluidine	lb.	0	0	10	to	0	0	11
Orthonitrotoluol	lb.	0	0	3	to	0	0	4
Para-amidophenol, base	lb.	0	8	6	to	0	9	0
Para-amidophenol, hydrochlor	lb.	0	7	6	to	0	8	0
Paradichlorbenzol	lb.	0	0	6	to	0	0	7
Paranitraniline	lb.	0	2	7	to	0	2	9
Paranitrophenol	lb.	0	2	3	to	0	2	6
Paranitrotoluol	lb.	0	2	9	to	0	3	0
Paraphenylenediamine, distilled	lb.	0	12	0	to	0	12	6
Paratoluidine	lb.	0	5	9	to	0	6	3
Phthalic anhydride	lb.	0	2	6	to	0	2	9
Resorcin, technical	lb.	0	4	0	to	0	4	3
Sulphanilic acid, crude	lb.	0	0	10	to	0	0	11
Tolidine, base	lb.	0	7	3	to	0	7	9
Tolidine, mixture	lb.	0	2	6	to	0	2	9

Essential Oils and Synthetics

The market this week has been very quiet, with practically no business passing. There are no changes of any sort to report.

Essential Oils.		£	s.	d.
Anise	c.i.f. 1/10 spot	0	2	0
Bay		0	11	0
Bergamot		0	12	0
Cajuput		0	3	9
Camphor, white	per cwt.	4	0	0
Camphor, brown	,,	3	15	0
Cassia	c.i.f. 7/9 spot	0	8	3
Cedarwood		0	1	6
Citronella (Ceylon)		0	3	3
Citronella (Java)		0	3	10
Clove		0	7	6
Eucalyptus		0	1	6
Geranium Bourbon		1	8	0
Lavender		0	11	0
Lavender spike		0	3	0
Lemon		0	2	11
Lemongrass	per oz.	0	0	2¾
Lime (distilled)		0	3	0
Orange sweet (Sicilian)		0	10	0
Orange sweet (West Indian)		0	9	0
Palmarosa		0	17	6
Peppermint (American)		0	13	0
Mint (dementholised Japanese)		0	6	3
Patchouli		1	12	0
Otto of Rose	per oz.	1	4	0
Rosemary		0	1	8
Sandalwood		1	6	0
Sassafras		0	5	0
Thyme	(firm) according to quality 2/6 to	0	8	0

Synthetics.				
Benzyl acetate		0	3	0
Benzyl benzoate		0	3	0
Citral		0	10	0
Coumarine	firmer	0	13	6
Heliotropine		0	6	6
Ionone		1	5	0
Linalyl acetate		1	2	6
Methyl salicylate	very firm	0	2	6
Musk xylol		0	9	0
Terpeniol		0	3	0

The Mexican Market for Chemicals

THE Mexican market for chemicals and drugs would appear to be an important one, for the United States Consul in Mexico City states that while there are three local manufactures they supply a very small percentage of the total consumption, and the imports of chemicals, drugs and dyes in 1921 approximated in value to $8,000,000, of which the United States supplied about 60 per cent., other countries, in the order of their importance, being England, France, Switzerland and Germany, though Italy, Spain, Sweden, Belgium, Japan and China also participate in the trade. The principal articles supplied by England are cyanide, potash, acids, colours and drugs; by France, colours, drugs and medicinal wines; by Germany, dyes and drugs. Before the war Germany had a large trade there. Statistics indicate only a moderate recovery up to 1921, but from information furnished by importers it is believed that Germany's percentage has increased notably in the last two years. The world war gave the American manufacturer a temporary monopoly of the Mexican market. Much of this increased business has been retained by the United States, but statistics indicate a partial recovery of trade by Europe. The decrease in imports from the United States in 1921 was accompanied by an increase of imports from Europe, although this increase was less than the corresponding decrease from the United States. The United States supplies the greater portion of the industrial chemicals used in Mexico, a line in which Germany was formerly a keen competitor. England ranks second in this class, being a heavy shipper of cyanide used in reducing ores. Mining is the second important industry in Mexico and creates a good demand for cyanide. The United States led also in dyes and paints in 1921, having supplied about 43 per cent. of the imports, as compared with 37 per cent. from Switzerland. Germany ranked third with 8 per cent., and England fourth with 4 per cent. There exists an old preference for German dyes. France has a slight lead in the drug market, supplying 42 per cent. of the drugs imported, as compared with 41 per cent. from American manufacturers. England is third with 5 per cent. Germany, Spain and Italy furnish most of the balance. Dealers state that there is a preference for French medicinal products. Importers assert that German prices are less than half the American, and that all European manufacturers offer better terms than the American at the present time, while European firms give longer credit. It may also be noted that all the importers consulted complained of the American packing. One of the largest wholesale and retail dealers in Mexico City estimates his losses from breakage on American shipments at 15 to 20 per cent. He asserts that he rarely has a loss from breakage on shipments from Europe.

Demand for Wood Distillation Plant

A CONSULTING chemist inquires for any firms which may be interested in the erection of portable or semi-portable plant for the distillation of wood. The inquirer has the option of purchasing the whole of the cordwood on 27 acres in Leicestershire, chiefly oak, with some ash and sycamore. The wood is several miles distant from a railway station, and the railway carriage to the nearest permanent wood distilling plant is too heavy to be remunerative. Any firms interested will be put in touch with the inquirer on communicating with THE CHEMICAL AGE.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

Glasgow, April 4, 1923.

ONLY a very moderate amount of business was put through during the past week.

The position in Germany is unchanged, and consequently prices continue firm.

Industrial Chemicals

ACID ACETIC.—Good inquiry both for home and export. Glacial, 98/100%, £65 to £69 per ton, 80% pure, £46 to £48 per ton, 80% Technical, £45 to £47 per ton, c.i.f. U.K. Ports.

ACID BORACIC.—Crystal or granulated, £55 per ton; powdered, £57 per ton, carriage paid U.K.

ACID CITRIC.—B.P. Crystals quoted 1/7d. per lb. spot delivery.

ACID FORMIC 80%.—Offered at £54 per ton, ex wharf.

ACID HYDROCHLORIC.—Makers' price unchanged at 6/6d. per carboy, ex works.

ACID NITRIC 84°.—£27 10s. per ton, ex station, full truck loads.

ACID OXALIC.—Unchanged at about 7d. per lb., ex store.

ACID SULPHURIC.—144°, £3 15s. per ton; 168°, £7 per ton; ex works, full loads; dearsenicated quality, £1 per ton additional.

ALUM, LUMP POTASH.—Unchanged at about £13 per ton, ex store. Quoted £10 10s. per ton, f.o.b. U.K. for export.

AMMONIA, ANHYDROUS.—Quoted 1s. 6d. per lb. ex station.

AMMONIA CARBONATE.—Lump, 4d. per lb.; ground 4½d. per lb., delivered. Good export inquiry.

AMMONIA MURIATE.—Grey galvanisers quality quoted £32 per ton, f.o.r. works; 98/100% white crystals about £38 per ton, ex store.

AMMONIA SULPHATE.—25¼%, £15 10s. per ton; 25¾% neutral, £16 13s. per ton, ex works. April-May delivery.

ARSENIC, WHITE POWDERED.—Moderate inquiry. Offered at £77 per ton, ex store, spot delivery.

BARIUM CHLORIDE.—98/100%. Now quoted £18 10s. per ton, ex store. Continental offers of £15 per ton, c.i.f. U.K.

BARYTES.—Finest white English, £5 5s. per ton, ex works.

BLEACHING POWDER.—£11 10s. per ton, ex station, spot delivery. Contracts, 20s. per ton less.

BORAX.—Crystal or granulated, £28 per ton; powdered, £29 per ton, carriage paid U.K. stations.

CALCIUM CHLORIDE.—English make, £5 15s. per ton, ex quay or station. Continental, £5 2s. 6d. per ton, c.i.f. U.K.

COPPERAS, GREEN.—Unchanged at about £2 15s. per ton, f.o.b., U.K. port.

FORMALDEHYDE, 40%.—Spot lots quoted £90 per ton, ex stores; about £88 per ton, ex wharf, early delivery.

GLAUBER SALTS.—Fine white crystals, £4 per ton, ex store.

LEAD, RED.—English make, £43 per ton, carriage paid U.K. stations. Continental make about £35 per ton, c.i.f. U.K.

LEAD ACETATE.—White crystals about £39 10s. per ton. Brown, £36 10s. per ton, ex store, spot delivery.

MAGNESITE, GROUND CALCINED.—Unchanged at £8 10s. per ton, ex station.

MAGNESIUM CHLORIDE.—Continental offers of £3 7s. 6d. per ton, c.i.f. U.K. Spot lots about £5 per ton, ex store.

MAGNESIUM SULPHATE (EPSOM SALTS).—Commercial £7 per ton, B.P. £8 10s. per ton. Continental about £5 per ton, ex store, for commercial crystals.

POTASH, CAUSTIC, 88/92%.—Spot lots now about £35 per ton, ex store. Offered from Continent at £34 per ton, c.i.f. U.K.

POTASSIUM BICARBONATE.—Offered from Continent at £35 10s. per ton, c.i.f. U.K.

POTASSIUM BICHROMATE.—Unchanged at 5¾d. per lb. delivered.

POTASSIUM CARBONATE.—90/92% quoted £27 10s. per ton, ex store; 96/98% about £32 per ton, ex store.

POTASSIUM CHLORATE.—Unchanged at 3d. per lb.

POTASSIUM NITRATE (SALTPETRE).—Refined granulated quoted £32 per ton ex store.

POTASSIUM PERMANGANATE.—B.P. crystals now quoted 10½d. per lb. Supplies scarce.

POTASSIUM PRUSSIATE (YELLOW).—Now offered at 1s. 5d. per lb., ex store.

POTASSIUM SULPHATE.—Offered at £7 5s. per ton, on basis of 80%, f.o.r. works.

SODIUM ACETATE.—Price about £24 10s. per ton, ex wharf; early delivery.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station. Mineral water quality, 30s. per ton less.

SODIUM BICHROMATE.—Unchanged at 4½d. per lb. delivered.

SODIUM CARBONATE.—Soda crystals, £5 to £5 15s. per ton, ex quay or station; alkali 58%, £8 17s. 6d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—Commercial quality, £10 10s. per ton; pea crystals, £15 10s. per ton, ex station.

SODIUM NITRATE.—96/98% refined quality, £13 5s. per ton, f.o.r., or f.o.b., U.K.

SODIUM NITRITE, 100%.—£27 to £29 per ton, according to quantity.

SODIUM PRUSSIATE (YELLOW).—Inclined to be higher at 9¼d. per lb., delivered.

SODIUM SULPHATE (SALTCAKE 95%).—Unchanged at £4 per ton on contract.

SODIUM SULPHIDE.—60/62% solid, quoted, £15 per ton, ex store. £1 per ton, extra for broken.

SULPHUR.—Flowers, £10 per ton; roll, £9 per ton; rock, £9 per ton; ground, £8 per ton; prices nominal.

TIN CRYSTALS.—Unchanged at 1s. 2d. per lb.

ZINC CHLORIDE.—98% solid English material £25 per ton, f.o.b. U.K. port.

ZINC SULPHATE.—Quoted £14 10s. per ton, ex station.

NOTE.—The above prices are for bulk business, and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

ANILINE OIL.—Fair inquiry. Price firm at 11½d. per lb. delivered, drums extra, returnable.

DIMETHYLANILINE.—Good inquiry. Price quoted 3s. per lb., delivered, carriage paid, drums extra, returnable.

METANITROTOLUENE.—Some inquiry for export. Price quoted 2s. per lb., f.o.b., U.K., packages included.

ORTHO CRESOL.—Fair inquiry for export. Offered at 5d. per lb. f.o.b. U.K., packages free.

PARANITRANILINE.—Fair home inquiry. Price quoted, 2s. 7d. per lb. delivered, packages free.

PARAPHENYLENEDIAMINE.—Small inquiry. Price quoted 10s. per lb., delivered, packages free.

PHTHALIC ANHYDRIDE.—Some inquiry. Price quoted, 2s. 2d. per lb., carriage paid, casks included.

Pulverising Plant

THE Fuller Engineering Co., 25, Victoria Street, Westminster, have recently supplied twenty-seven of their Fuller-Lehigh pulveriser mills in various sizes for fine grinding work with materials such as coal, limestone, raw cement materials, lithopone, rubber, and charcoal. The same firm have also secured contracts for the supply of two complete plants for pulverised coal preparation, transportation, and burning equipment, having a capacity of 120 tons of coal per day each, as well as for three similar plants with a capacity of 240 tons per day and for plants to deal with 360 and 440 tons of coal daily. These plants are for use in connection with boilers, furnaces and cement kilns.

Manchester Chemical Market

(From our own Correspondent.)

Manchester, April 5, 1923.

The chemical market opened only quietly after the holiday break, but later, in the aggregate, a fair amount of business was done at firm prices. The home demand for the leading heavy chemicals has been on a comparatively good scale, while for overseas markets, principally Colonial, business has also been reasonably active. Chemical shares have again been well supported on the Manchester Stock Exchange.

Heavy Chemicals

Caustic soda is still being taken up steadily by home users and also for shipment; prices are firm and range from £19 per ton for 60 per cent. to £21 10s. for 76–77 per cent. strength. Bleaching powder is also an active section of the market, the demand being well maintained for both branches of trade; the quotation keeps steady at £11 10s. per ton. Soda crystals continue quiet at £5 5s. per ton, delivered. Saltcake meets with a moderate inquiry from home consumers, and for export at £4 10s. and £5 per ton respectively. Sodium sulphide, 60 to 65 per cent. concentrated, is inactive at about £15 per ton, with crystals on offer at £9. Glauber salts are quiet at £4 per ton. Bicarbonate of soda is in moderate request at £10 10s. per ton delivered to home users. Alkali still finds a ready sale for home and export at £7 12s. 6d. per ton for 58 per cent. material. Hyposulphite of soda is quiet but steady at £15 10s. per ton for photographic crystals and £9 10s. to £10 for commercial. Nitrite of soda meets with a very subdued demand, though prices show little change at £26 10s. to £27 per ton. Phosphate of soda keeps firm at £15 to £15 10s. per ton, but only a moderate amount of business is being done. Chlorate of soda is firm and active at 3d. per lb. Prussiate of soda is still on the quiet side, but prices are steady at 9d. to 9¼d. per lb. Bichromate of soda is firm and in fair demand at 4½d. per lb. Acetate of soda is again firmer on scarcity of available lots, current quotations being round £25 per ton.

Caustic potash prices are strongly maintained at round £33 10s. per ton for 88–90 per cent., a steady business being put through. Carbonate of potash is also being steadily called for at £31 to £32 per ton for 96–98 per cent. material. Bichromate of potash is steady and in fair demand at 5¾d. per lb. Yellow prussiate of potash is still inactive at 1s. 5¼d. per lb. Chlorate of potash is in good inquiry at 3½d. per lb. Permanganate of potash is firmer at 9½d. per lb., supplies being steadily taken up.

Sulphate of copper continues in moderate demand for export at £26 to £26 10s. per ton. Arsenic is still scarce, and meets with a steady inquiry for shipment, prices consequently being very firm at £75 per ton for white powdered, Cornish makes. Commercial Epsom salts are a fairly active section at £6 10s. per ton for British makes and about £5 for foreign; magnesium sulphate, B.P., is on offer at about £7. Acetate of lime is very firm at £20 for grey and £10 10s. per ton for brown, available supplies being scarce. Nitrate of lead is in moderate request and firmer again at £43 10s. per ton. White sugar of lead is firmer at £41 per ton, with brown quoted at £36 to £38.

Acids and Tar Products

Tartaric and citric acids still meet with a moderate inquiry and prices are unchanged, tartaric acid being offered at 1s. 3d., and citric, B.P. crystals, at 1s. 8d. to 1s. 8½d. per lb. Acetic acid is steady and in good demand at £68 to £70 for glacial, and £47 per ton for 80 per cent. technical. Oxalic acid is quiet but steady at 6½d. to 6¾d. per lb.

Quotations for pitch are nominally between £9 and £10 per ton f.o.b. Manchester, but prompt parcels are difficult to obtain. Carbolic acid crystals are firm and in good export demand at 1s. 8d. per lb., with crude, 60 per cent., unchanged at 4s. to 4s. 6d. per gallon. Benzole is fairly active at 1s. 8d. per gallon. Solvent naphtha keeps rather quiet but steady at 1s. 9d. per gallon. Creosote oil is stronger again at 10d. to 10½d. per gallon. The demand for naphthalene is improving, and refined is quoted at £18 to £19 per ton, with crude varieties on offer at £7 to £11.

Sir S. W. Royse and Co.'s Monthly Report

Whilst the actual volume of business in the home trade during March has been only moderate, there has been a good undertone, and prices generally have been firm and in many cases have advanced. This can be accounted for largely by the position on the continent and an increased demand from some oversea markets. Sulphate of copper has been in better request, and a good business has been put through for both home and export account. The returns for February show a big improvement on the figures for January and also on those of twelve months ago. Last month 8,575 tons were shipped as against 3,942 tons in February, 1922. Prices have ruled firmer, but do not respond to the increased cost of production. Green copperas is in better demand, especially for shipment, but with little alteration in values. Acetates of lime are still scarce and firmly held.

Acetic acid has further advanced with little offering and is in a strong position; so far this has had little effect on acetates of soda and lead, but there is less disposition to realise stocks of these articles. A good trade has been passing in nitrate of lead and makers are well sold. Stocks of carbonate and caustic potash are only moderate, and prices have advanced. The call for yellow prussiate of potash has been slow, and lower prices have been accepted for spot sales, but little is offering for forward delivery. Soda also has ruled rather easier with a lessened demand. White powdered arsenic continues to be offered in only small lots, and prices are fully maintained; offers of foreign low-strength qualities have had no effect on the market. Tartaric acid has been in fair request for forward delivery, with continental makers asking higher prices, whilst cream of tartar has been selling steadily for near delivery only. Citric acid has remained firm with a good export demand. Tartar emetic continues in request for export. There is no change to report in bichromates or chlorates of potash and soda.

Nitrite of soda is scarce and bringing better prices. Borax and boracic acid have been in steady call, but phosphate of soda is dull. Oxalic acid is quiet, but higher figures are asked by continental makers. Salammoniac has been in only small request, but muriate of ammonia has remained quietly steady. Bleaching powder and caustic soda have been in better demand for the home trade, and have also had increased shipments abroad.

There is little change to report in tar products. Benzols and toluols have remained quiet without alteration in values. Solvent naphtha is without inquiry, and figures if anything are easier. Creosote continues in good inquiry and prices remain steady. Crude carbolic acid is a firm market and supplies are scarce, but resale lots of crystal carbolic are being pressed for sale. There is a better call for naphthalenes at increased values. The demand for pitch for this season's shipment continues, and prices have again advanced. More inquiry is being received for next season, but little business is reported, buyers not being disposed to accept the discount on present prices offered by makers. In South Wales the position remains unchanged. The first cargo of American pitch has arrived and the quality is reported satisfactory. In sulphate of ammonia only moderate business is passing for the home market, but exports are increasing.

French Potash

The seasonal increase in sales of potash has, on the whole, been satisfactory, and buying interests especially in the later districts are maintaining a steady demand for all grades. Compared with last spring season, French kainit and sylvinites have been in better request, but sales of sulphate of potash, and in a lesser degree muriate, have not as yet come up to expectations. The necessity for potash manuring appears to be now more generally recognised, and full advantage is being taken of the prices at which the lower grades are being offered. Foreign trade in potash salts is fairly active, with the more concentrated grades in better demand. The mines of Alsace are maintaining ample supplies of all grades, and every effort is being made to expedite delivery.—*French Potash Mines Bureau.*

Company News

THE ASSOCIATED PORTLAND CEMENT MANUFACTURERS, LTD.—The transfer books and register of members of the ordinary shares are closed until April 17, for the preparation of dividend warrants.

BRITISH GLUES AND CHEMICALS, LTD.—The directors regret that it has been found necessary to postpone payment of the half-yearly dividend on the 8 per cent. cumulative preference shares due on April 1.

ENGLISH MARGARINE WORKS (1919), LTD.—The directors announce that after consideration of the accounts for the nine months ended December 31, 1922, they regret they are unable to declare a dividend on the cumulative preference shares.

EGYPTIAN SALT AND SODA.—The report for the year to August 31 last shows a net profit of £E101,254, to which is added £E54,026 brought in. The directors propose a dividend of 17½ per cent. on the share capital, carrying forward £E48,808.

RIO TINTO CO., LTD.—The fiftieth ordinary general meeting of the shareholders will be held at the offices of the company, 3, Lombard Street, London, on Thursday, April 12, at 12.30 p.m. The transfer books will be closed from April 14 to April 30, both days inclusive.

CYPRUS ASBESTOS.—The first report shows a balance of profit and loss for the year ended December 31, 1922, of £23,121, which, with accrued interest received from the Middle East Development Corporation, makes a total of £25,438. The directors propose to pay a preference dividend of 10 per cent., and to carry forward £7,019.

PINCHIN, JOHNSON AND CO., LTD.—At the annual general meeting held on Wednesday, March 28, a further dividend of 10 per cent. actual on the ordinary shares less income tax was declared, making 15 per cent. for the year. The sum of £6,000 has been written off the preliminary expenses of the new capital issue made in 1920; £7,000 has been carried to general reserve, and £16,905 is carried forward to 1923.

FULLER'S EARTH UNION.—The directors recommend that the issued ordinary shares be converted into 11 per cent. non-cumulative preferred ordinary shares, and the issued founders' shares into ordinary shares. It is proposed to capitalise £24,636 of the reserve fund, and allot one new fully paid £1 ordinary share in respect of each four present ordinary shares, and to distribute 6d. per share out of the special reserve fund, and to give 99 new fully paid ordinary shares and £10 in cash for each founders' share.

LEVER BROTHERS, LTD.—The report for 1922 states that the balance of £4,625,018 standing to the credit of profit and loss account, after providing for repairs, renewals and alterations, depreciation and insurance, has been appropriated as follows:—Dividend on 7 per cent. preference shares, £1,650,806; dividend on 8 per cent. A preference shares, £1,238,400; dividend on 20 per cent. preferred ordinary shares, £300,000; dividend on 20 per cent. A preferred ordinary shares, £600,000; dividend on 20 per cent. B preferred ordinary shares, £52,400; dividend on 5 per cent. preferred ordinary shares, £47,643; co-partnership dividends, £196,478; dividend on ordinary shares at the rate of 10 per cent. per annum, £233,917; reserve fund, £250,000; balance carried forward, £55,370. The annual general meeting will be held at the Lyceum, Port Sunlight, Cheshire, at 12 o'clock noon on Thursday, April 12.

UNITED GLASS BOTTLE MANUFACTURERS, LTD.—Presiding on Wednesday, March 28, at the tenth ordinary general meeting, Sir Ernest F. Oldham said their hopes of better trade had not, perhaps, been fully realised, but the net result had been a profit for this year of £37,867, as compared with a loss of £139,713 for last year. Trade had been during the past year, and still continued to be, of a very fluctuating nature, but on the whole the directors were of opinion that the tendency was upward, and they looked forward with every confidence to the future. The lightening of taxation—particularly the duty on sugar—would very materially increase consumption in the trades on which they mainly relied. It would bring in more to the revenue and bring about a revival of those very important industries. It was with great regret that, under existing circumstances, the directors did not feel justified at present in resuming the payment of the dividends on the preference shares. He was sure, having regard to the difficult times through which they had passed and might still have to face, that it was only prudent to conserve their resources.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT.	MATERIAL.	REF. NO.
South Africa.....	Varnishes and enamels.	D.O.T. 10872/E.D./C.C./2.
Denmark.....	Edible animal oils and fats for the margarine industry.	—
Netherland East Indies	Photographic chemicals.	—

Tariff Changes

EGYPT.—The import duty on certain articles has been revised, including copper, brass, tin, lead and zinc in ingots, sheets, etc., and also on phosphor bronze antimony and quicksilver.

POLAND.—Import duties on the following substances have been increased: Blown glass, rough samples; acetic acid; wood spirit; acetone.

Recent Will

Mr. James Boyd, of 102, Derwent Road, Palmers Green, London, late of the British Asbestos Co., Ltd. £3,894

Poison Gas in War

A REPORT has just been issued in the series on the *Official Medical History of the War* dealing with the diseases resulting from gas warfare. This is the second volume of the series, which is being edited by Major-General Sir W. G. Macpherson.

The principal gases used may be classified as acute lung irritants, lachrymators, direct poisons of the nervous system or paralysants, sensory irritants of the eye, nose, and upper respiratory passages, and vesicants or skin-blistering gases. It was found that 24 per cent. out of 4,207 cases of chlorine or cloud-gas (acute lung irritant) poisoning died, while during the time lethal gases, *e.g.* phosgene, were used the mortality was only 6 per cent. of 8,806 cases, protective measures having shown a considerable advance. But during the mustard-gas period, *i.e.* from July, 1917, to the Armistice, the average mortality was 2·6 per cent. of 160,970 cases. That is, the mortality showed a progressive decline in the case of (1) cloud or lung irritant gas, (2) lethal, and (3) mustard gas, a more or less non-lethal gas.

The protection that was gradually developed by the British chemical services was very efficient, and had much to do with this diminution of mortality. It is claimed, indeed, that these protective measures were more effective than those taken by the enemy against Allied gas attacks.

Another problem that required attention was the protection of men in tanks from poisonous gas, notably carbon monoxide, emanating from their own exhaust-pipes or the exhausts of other tanks in front of them—*i.e.* from causes in no way connected with enemy action. The risks, however, associated with both accumulation of carbon monoxide and a high temperature were greatly diminished by improved ventilation. Again, the medical services were also confronted with numerous cases of gas poisoning in mine warfare. By far the greatest number of gas-poisoning cases in mining was caused by carbon monoxide, and it was readily understood that this could result only from the explosives used. A large number of cures were effected by the administration of oxygen combined with artificial respiration. The book also contains an account of the value of the use of oxygen to aviators when flying at great heights in rarefied air.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

Bill of Sale

SUMERFIELD, Frederick William, 5, Keppel Road, Chorlton-cum-Hardy, chemical merchant and manufacturer. (B.S., 7/4/23.) March 22. £50.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]*

London Gazette

Company Winding Up

LANCASHIRE PHOSPHATES, LTD. (C.W.U., 7/4/23.) Winding-up order, March 14.

Company Winding Up Voluntarily

KELASTO AND RECELT CO., LTD. (C.W.U.V., 7/4/23.) A. Taylor, 18, Southampton Buildings, Chancery Lane, W.C., chartered accountant, appointed liquidator. Meeting of creditors at 18, Southampton Buildings, Chancery Lane, W.C., on Thursday, April 12, at 3 p.m.

Bankruptcy Petition

COE (WILLIAM W.), (junior), 24/26, Holborn, London, chemical manufacturer. A bankruptcy petition has been presented by Debenhams, Ltd., 91, Wimpole Street, Cavendish Square, London, warehousemen, and will be heard in the High Court of Justice on April 16, at 11 a.m.

Partnerships Dissolved

THE PARKSIDE MANUFACTURING CO. (John Wallace CONGDON, Spencer KENWARD and William Thomas PUDDIFOOT), perfumers and toilet specialists, 122, Petherton Road, Clissold Park, by mutual consent as from March 22, 1923. Debts received or paid by J. W. Congdon and S. Kenward who continue the business.

CAMPION AND CO. (Sydney Hooper CAMPION and Charles Henry BOOTH), chemists, 730 and 723, Old Kent Road, London, S.E., by mutual consent as from March 26, 1923. Debts received and paid by C. H. Booth.

New Companies Registered

B. BEDLOW AND SONS, LTD., 142, Battersea Park Road, London, S.W. Manufacturers of and dealers in soaps, inks and varnishes, chemical, industrial and other preparations. Nominal capital £25,000 in £1 shares.

JOHN BOYLE, LTD., 123, King Street, Kilmarnock. Dry-salters. Nominal capital, £10,000 in £1 shares (2,000 cumulative preference and 8,000 ordinary).

COMMERCIAL COLOURS, LTD., Meadowside Works, Didsbury, Manchester. Manufacturers, importers and exporters of and dealers in colours of all kinds. Nominal capital £5,000 in £1 shares.

GOODWYNNE, LTD., 12, Tokenhouse Square, London, E.C.1. Manufacturers of and dealers in chemicals, drugs, dyes, agricultural fertilisers, oils, paints and varnishes, soap, etc. Nominal capital, £4,000 in £1 shares.

SACCHARIN CORPORATION, LTD., 72, Oxford Street, London, W.1. Manufacturers, importers and exporters of and dealers in saccharin and substances used in connection therewith. Nominal capital, £15,000 in £1 shares.

FLEMING SHAW & CO., LTD., 20, Castle Street, Liverpool. Manufacturers, importers and exporters of and dealers in drugs, ores, nitrates, oil, vegetable products, etc. Nominal capital, £100,000 in £10 shares (7,200 7 per cent. participating cumulative preference and 2,000 ordinary).

VULCAN DISINFECTANT CO., LTD., 4, Old Cross Chambers, King William Street, Blackburn. Manufacturers of soaps, polishes, pastes and sanitary materials. Nominal capital, £1,000 in £1 shares.

Germany's Tar and Tar Products

THE Commercial Secretary at Cologne (Mr. C. J. Kavanagh) has forwarded to the Department of Overseas Trade an extract from the *Deutsche Bergwerks Zeitung* of March 2, which states that in spite of the occupation of the Ruhr coal district, which has now lasted six weeks, work is still progressing at the coke works and the Ruhr mines. It is, of course, impossible to prevent certain difficulties from arising, but it has been ascertained that the coking works have been sufficiently charged. So far the tar production has not been decreased in the mines occupied, although in some places it has been necessary to dump part of the production, owing to the impossibility of despatching the crude tar. The tar distilleries are working almost without interruption. In so far as the production of pitch and tar oils cannot be despatched there are sufficient tanks and warehouses to take the stock for some months yet. Within the occupied territory the consumers are being supplied. In the unoccupied territories in the east and south the production passes over to consumption. The demand still exceeds the available stocks. Export is arranged for by the sellers in agreement with the foreign buyers.

The general sale prices fixed for February since the last coal price increase are to be retained for the month of March, as no increase takes place either in wages or in the price of coal.

The sale prices are as follows :—

Pitch	110,000—115,000 Mks.
Heating oil	100,000 Mks.
Motor oil	110,000 Mks.
Impregnating oil	100,000 Mks.
Carbolineum	130,000 Mks.
Washing benzol oil	135,000 Mks.
Fat oils	135,000—165,000 Mks. (according to their viscidity).
Pure naphthalene	300,000 Mks.
Crude naphthalene	100,000 Mks.

per 100 kg., free at works. In consequence of the fall of the foreign exchange these inland prices are in part above world market prices. The import of foreign mineral oils is, therefore, unavoidable, and these are bought by consumers to cover their requirements for the time being. Benzol, cresol and carbolic acid are still in great demand. The prices for these products are adapting themselves more and more to world market prices, and will, therefore, follow the various fluctuations.

The Calcium Arsenate Shortage

THE United States Bureau of Mines is co-operating with the Geological Survey and the Bureau of Entomology and Chemistry of the Department of Agriculture in investigating the production of calcium arsenate as well as the shortage in and the possible augmentation of production of white arsenic, arsenic trioxide, from which calcium arsenate is made. Calcium arsenate is the best medium known at present for exterminating the boll weevil, which has been and is causing much destruction to the cotton crop. This interdepartmental investigation is the outgrowth of the recent Senate resolution directing an inquiry into the subject. The bureau is also represented on the committee of producers, manufacturers, consumers, and interested Federal bureaus, which is chiefly studying means for stabilising the arsenic market to encourage production. Later the problem of obtaining arsenic from ores will be studied.